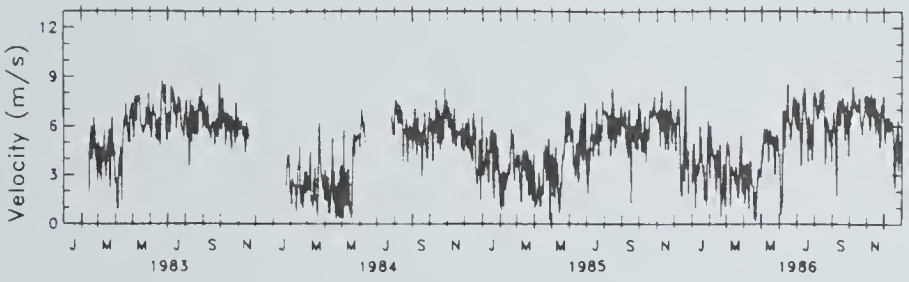
Report of the Meteorological Station at St.Peter and St. Paul Rocks (1985-1986)

1983-86 Wind Speed (daily values)



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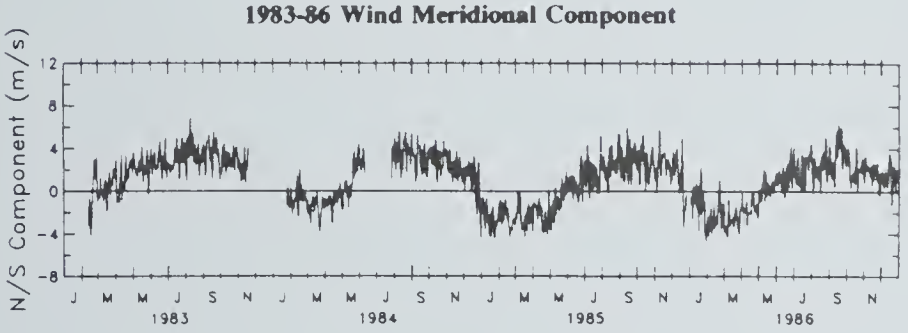
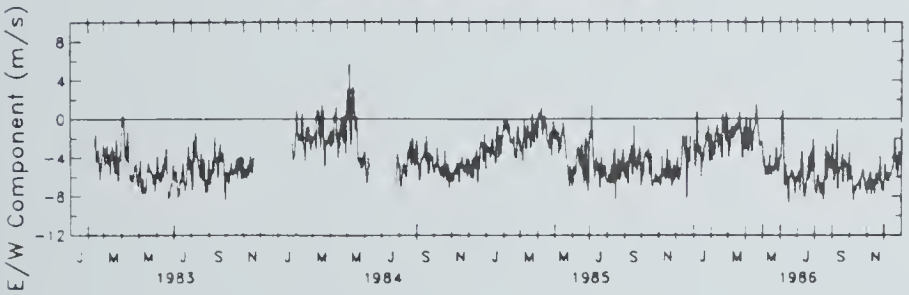


1983-86 Wind Zonal Component



LDGO 88-1
LAMONT-DOHERTY GEOLOGICAL OBSERVATORY
OF COLUMBIA UNIVERSITY
PALISADES, NEW YORK
1988

Report of the Meteorological Station at St.Peter and St. Paul Rocks (1985-1986)

By

Mark Edwards
Silvia Garzoli
Eli Katz
Miguel Macció

LDGO 88-1
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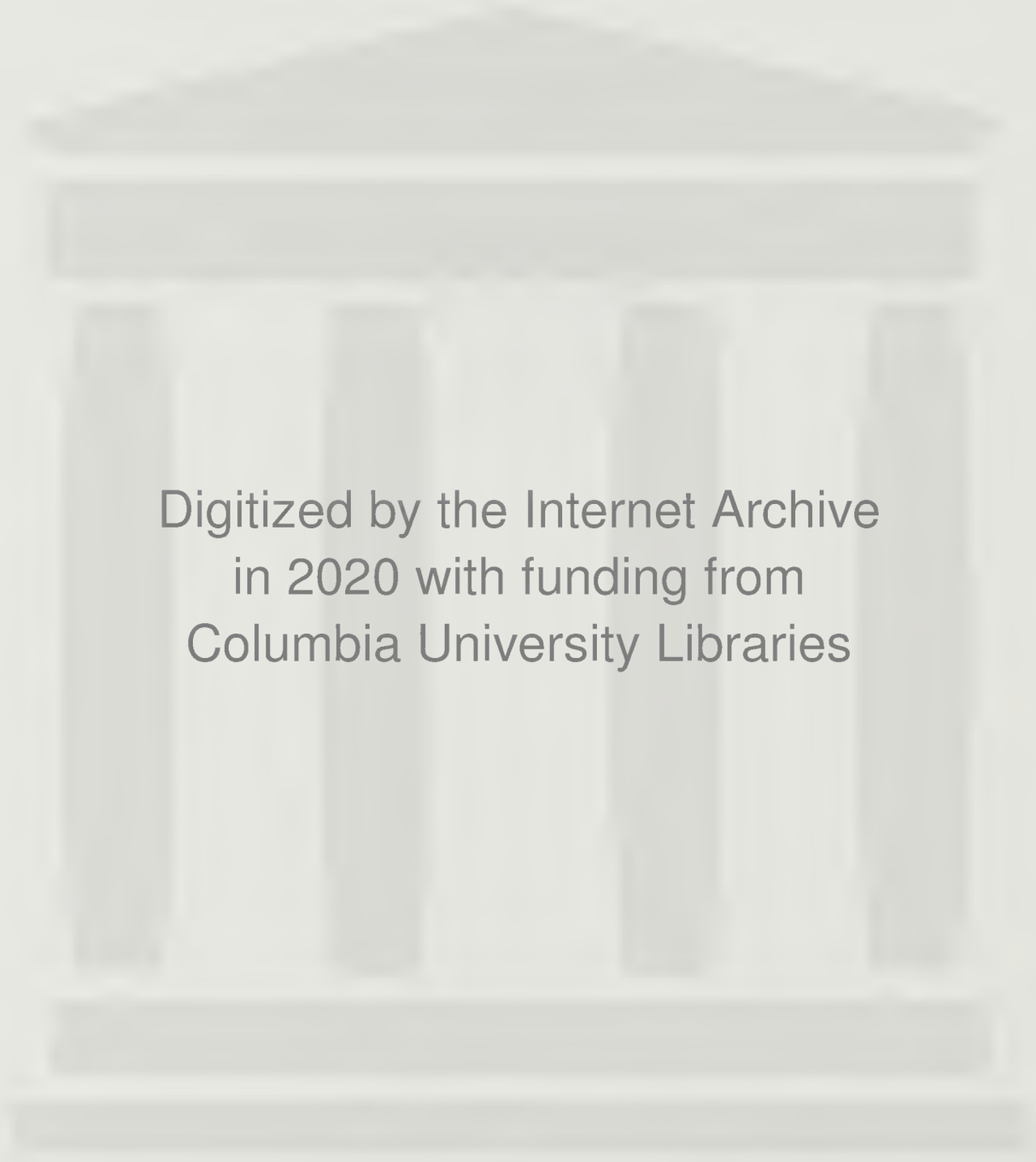
OF COLUMBIA UNIVERSITY
PALISADES, NEW YORK
1988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INTRODUCTION

This publication is Part II of a report on the meteorological data collected at the station on St. Peter and St. Paul rocks. In Part I, Mele *et al.* (1986) presented the data for the years 1983 and 1984; this report presents the data collected during the years of 1985 and 1986.

The locations of the rocks (0°55'N 29°21'W), an outcrop of the mid-Atlantic ridge 1000 kilometers from the nearest landfall, is an ideal location to measure unobstructed winds in the equatorial Atlantic basin. The first station at this location was installed as part of the First GARP Global Experiment (FGGE) (see Garzoli *et al.* 1982). The present installation was originally designed by Richard Nowak (WHOI) and deployed in February 1983 as part of the Seasonal Equatorial Atlantic Experiment (SEQUAL). Since then, it was refined and partially redesigned by Esteban Draganovic and Miguel Macció. The station consists of two anemometers mounted orthogonally in an aluminum cage and an atmospheric pressure transducer at its base. The cage was wrapped with a chicken wire net in order to prevent nesting by native birds and mounted on a 4 meter pole; the base being approximately 24 meters from the mean sea level. The pressure transducer, electronics, and batteries were enclosed in a sealed and vented case at the base of the tower. The anemometers were sampled continuously and wind speed was averaged over each hour. All data were recorded hourly on a Sea-Data cassette. The main difference between the original 1979 station and the present installation is a satellite transmission capability. Every three hours all the data, the battery voltage, and the platform status are transmitted to the US via the GOES system. After SEQUAL, the station was maintained operational as part of the Tropical Ocean Global Atmosphere (TOGA) program jointly funded by the National Science Foundation and the NOAA/TOGA Office. Data is collected, processed, and analyzed at Lamont-Doherty Geological Observatory.

In this report data collected with the anemometers (wind data) and the atmospheric pressure sensor are presented. The pressure transducer has a drift that appears to be highly linear with time. From a simple linear regression of all five years of data (from 1983 through 1988), it was estimated to be 7 x 10^{-3} millibars/day (0.21 millibars/month). In order to correct the data for the instrument drift, this value was added cumulatively to every hour of data. The corrected pressure correlates well with the observations obtained during the maintenance cruises.

Only data from one of the wind sensors was fully processed since there are little variation between the two data sets. Data from the other sensor was used to verify and validate what could have been anomalous in the register. Cassette data were used when available to fill gaps in the satellite

transmission. When there were no cassette records to correct gaps or the data were obviously spurious, one of two methods was employed to fill in the gaps in the time series of less than 5 days. A linear interpolation was performed if only one or two hours were missing. For longer periods of missing data, values 24 hours before and 24 hours after were used for interpolation purposes.

The data are presented in two parts each one corresponding to the years of 1985 and 1986, respectively. The oceanographic convention is used to present the wind observation: Direction is where the wind is going. A correction for magnetic north deviation (magnetic variation) of -21.65° has been applied to the observed values. All figures are hourly values with the exception of the stick plots which are daily averaged data. Each part consists of five yearly figures: a stick plot of velocity (meters/sec) and time series of the pressure (millibars), velocity (meters/sec), north/south and east/west components (meters/sec). Each yearly figure is followed by twelve sets of four plots of the same variables (pressure, velocity, and wind components). In the monthly figures, the left end of the horizontal axis represents the first day of the month, and the right end represents the first day of the following one. Furthermore, a table that shows the monthly values as well as the standard deviation is given at the end of each year. Finally, the complete data for the years 1983 through the end of 1986 is presented in a combined figure. Please note that the scale of the four-year stick plot of velocity is different from the others.

Acknowledgements

We are indebted to the Brazil Government for granting permission to deploy the station in their territory. The authors are indebted to all the crew members of the scientific cruises from which the mantainance and repairs to the station were performed during this period: R/V GYRE 84G10; R/V ENDEAVOR 85136 and R/V CONRAD 2801. We also want to thank Phil Mele who initially processed the data and to Susan Brower for her collaboration in the preparation of the report. The meteorological station at St. Peter and St. Paul Rocks is still operational. The data was collected and this data report was prepared under NSF Grant OCE 84-15319.

References

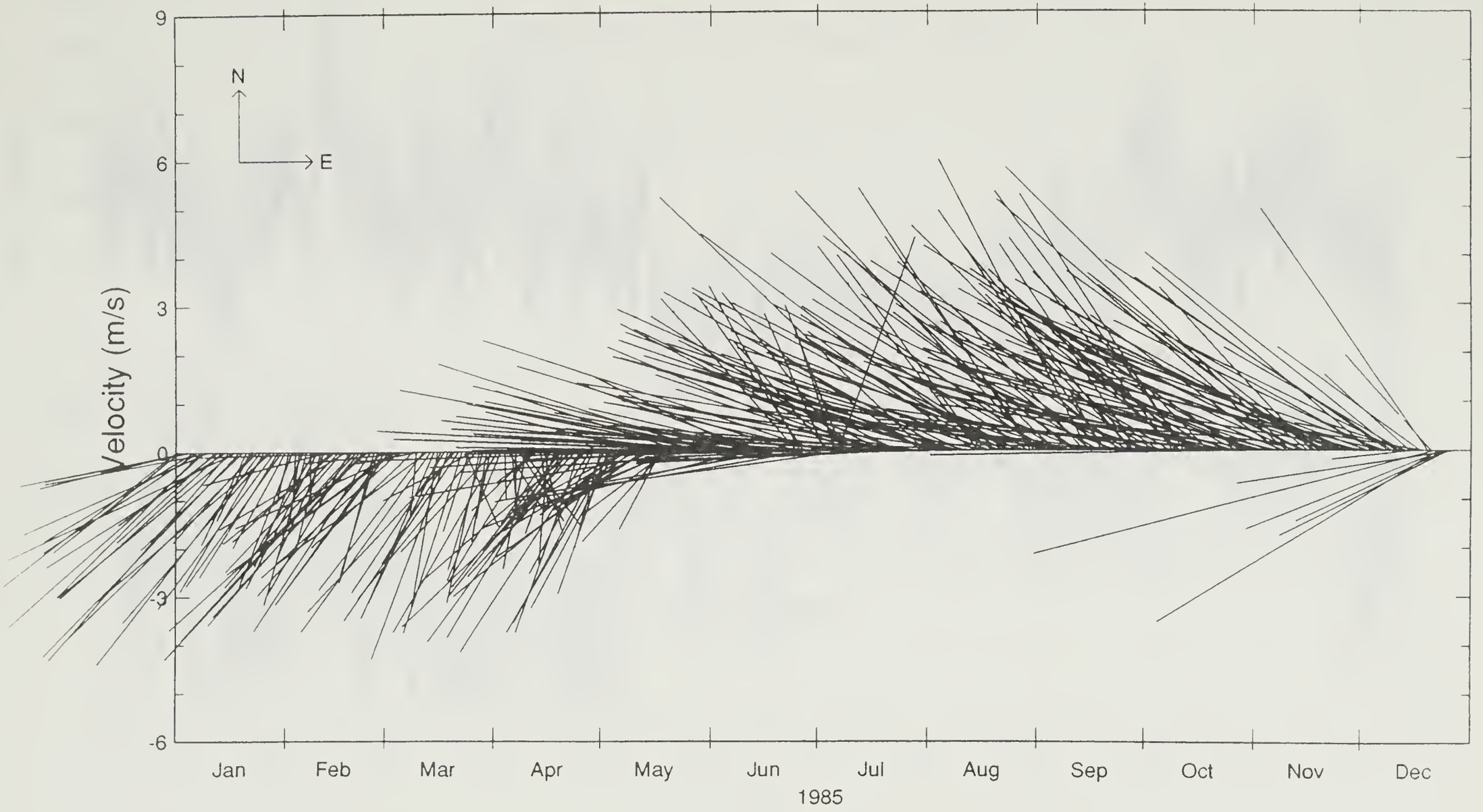
Mele, P.A., S.L. Garzoli and E.J. Katz (1986). Report of the Meteorological Station Data at St. Peter and St. Paul Rocks During SEQUAL (1983-1984). Lamont-Doherty Geological Observatory of Columbia University; 66pp.

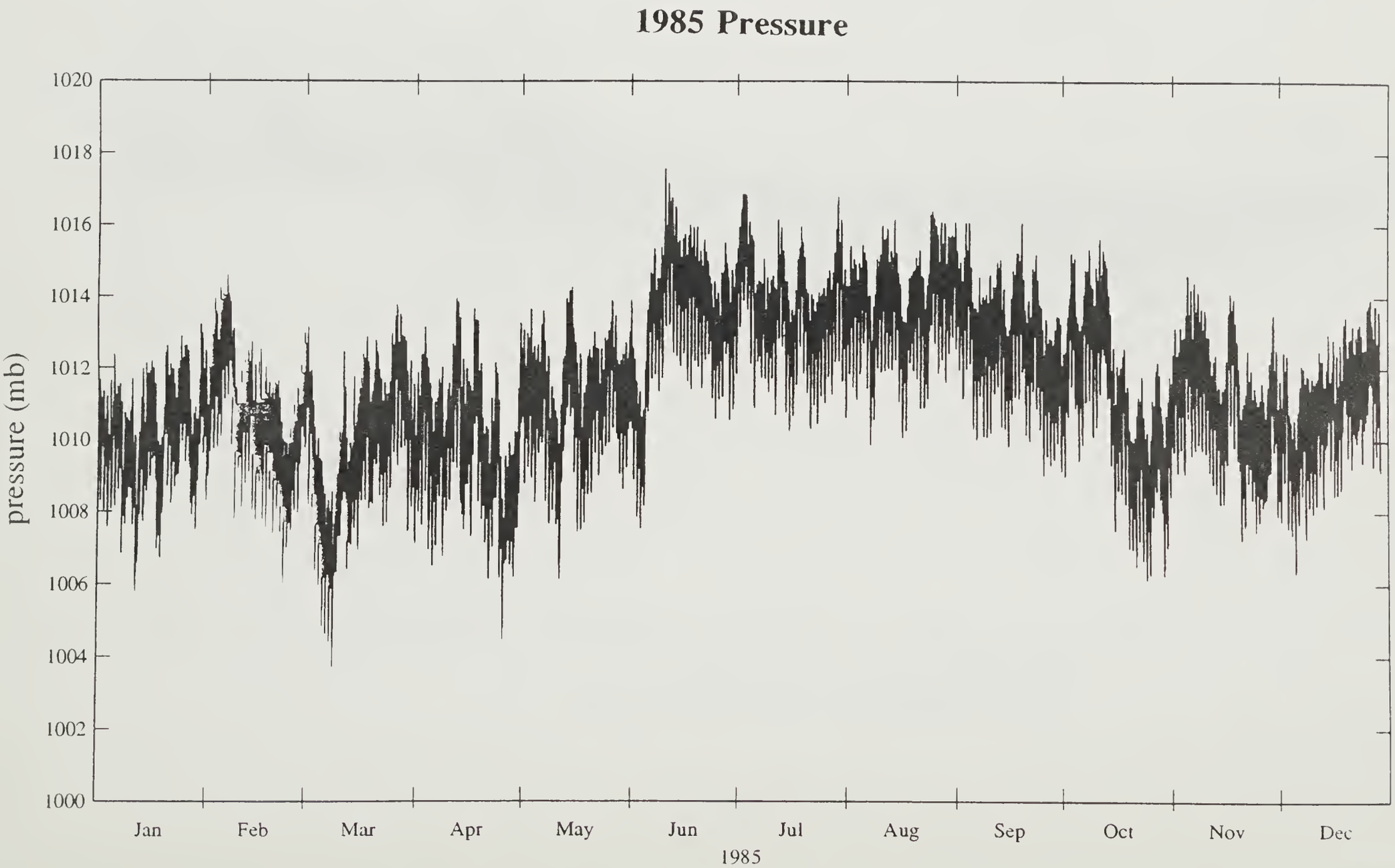
Garzoli, S., E. Katz, H. Panitz, P. Speth (1982). "In Situ Wind Measurements in the Equatorial Atlantic During 1979." Oceanol. Acta, Vol. 5, No. 3.

1985

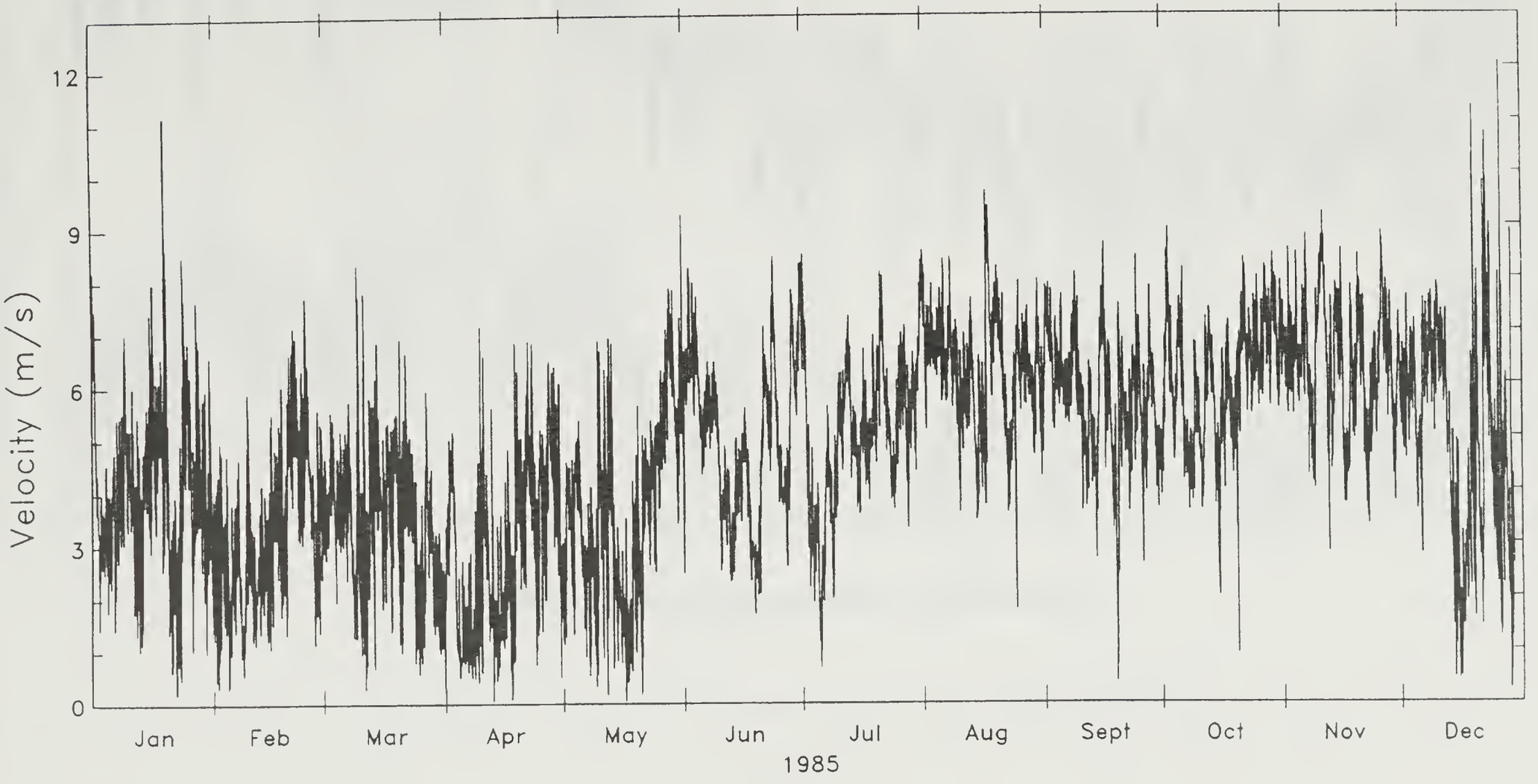
January 1 - December 29

1985 Wind Speed (daily values)




1985 Pressure
pressure (mb)
1020
1018
1016
1014
1012
1010
1008
1006
1004
1002
1000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
1985

1985 Wind Speed (hourly values)



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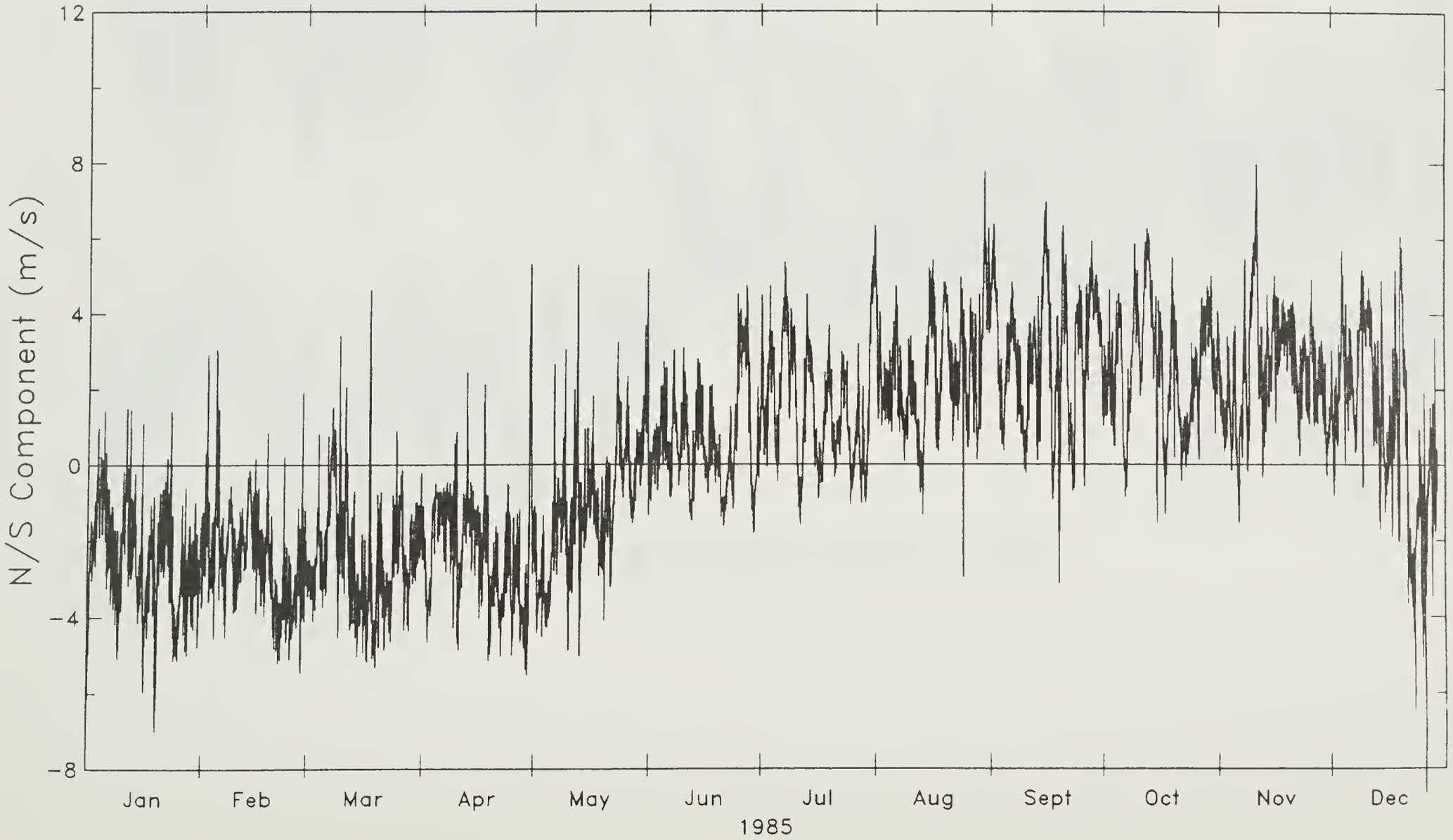
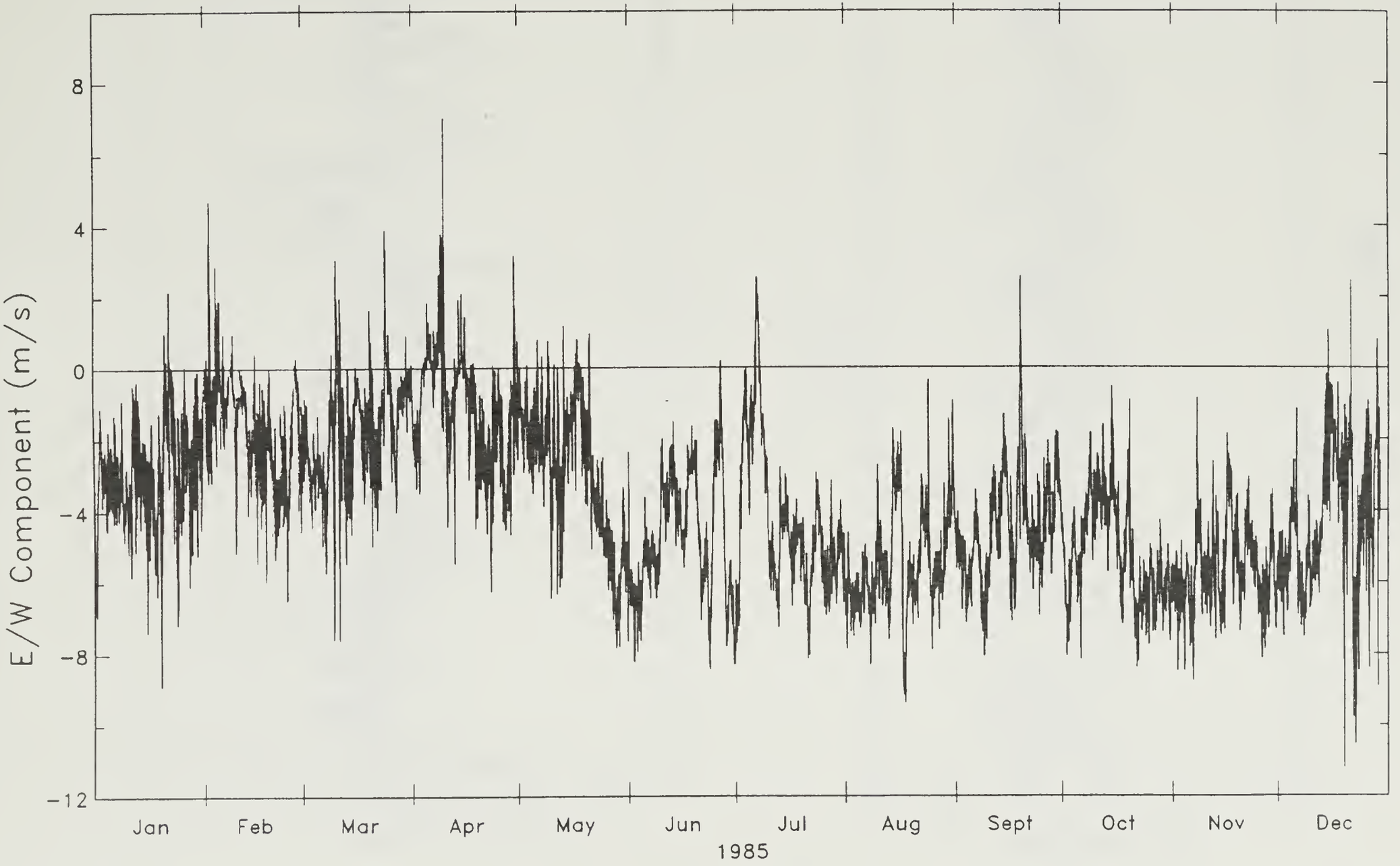


1985 Wind Zonal Component



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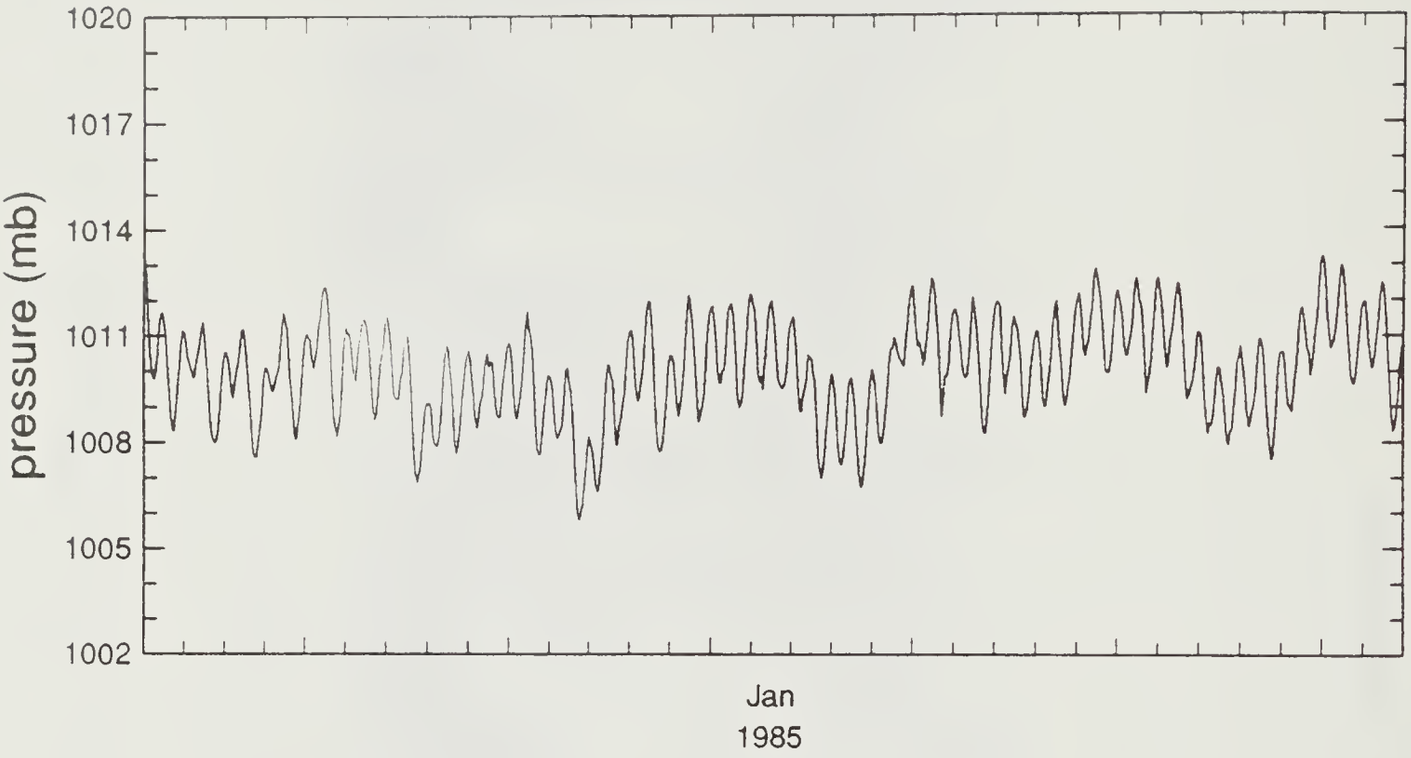
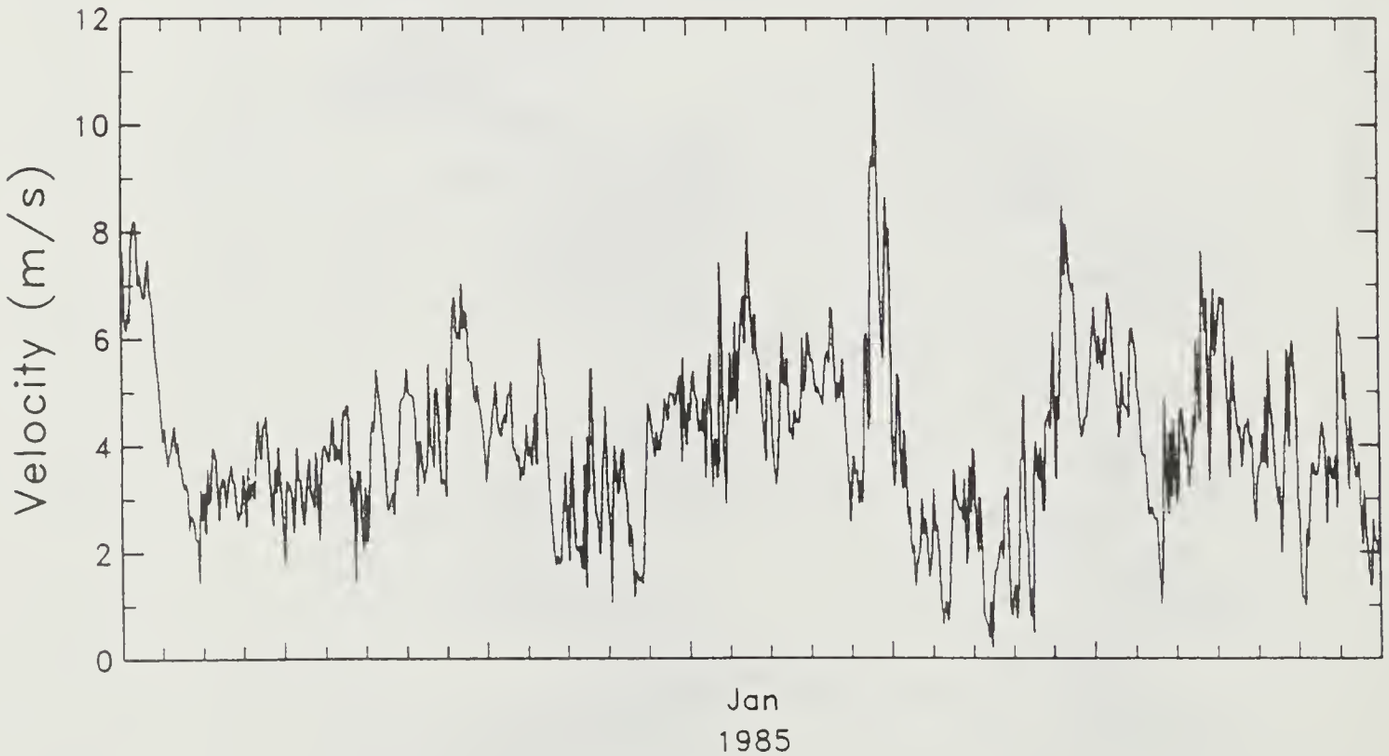
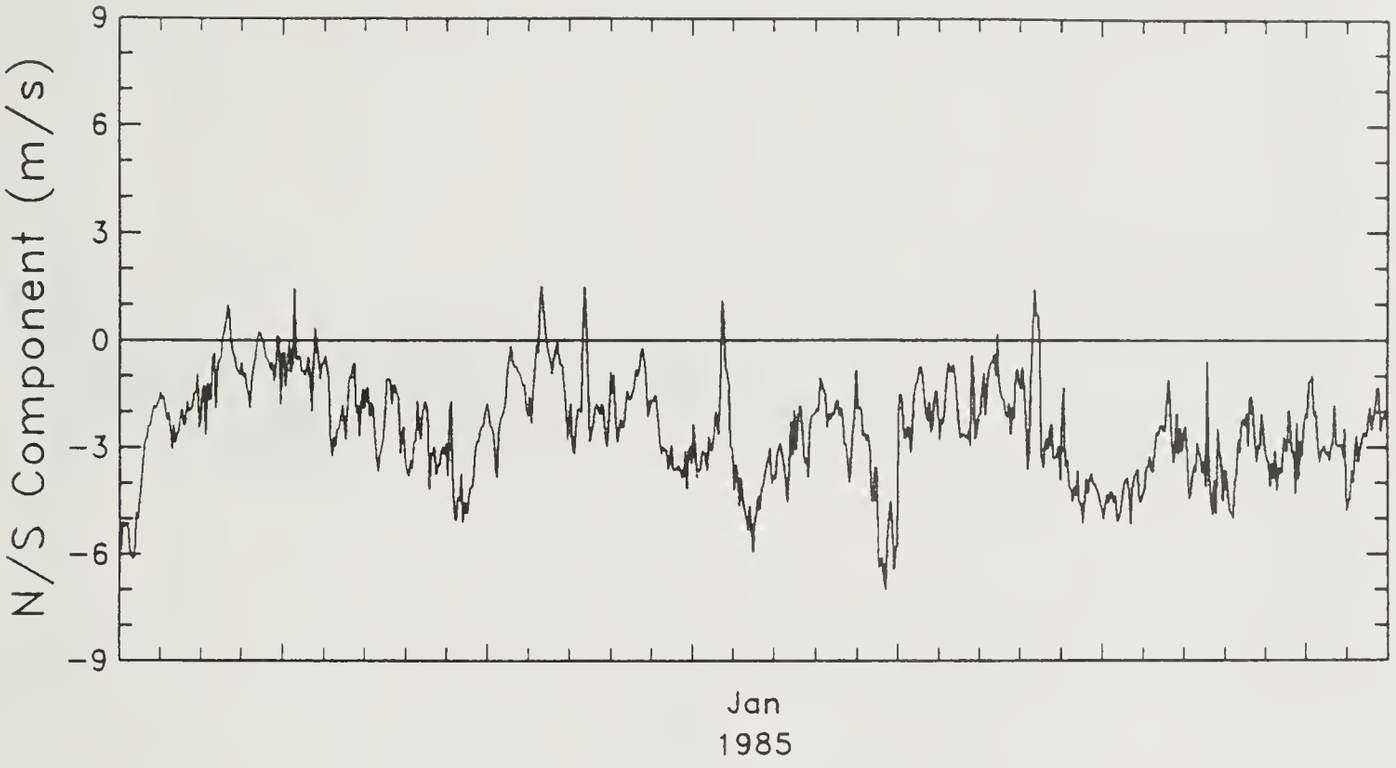
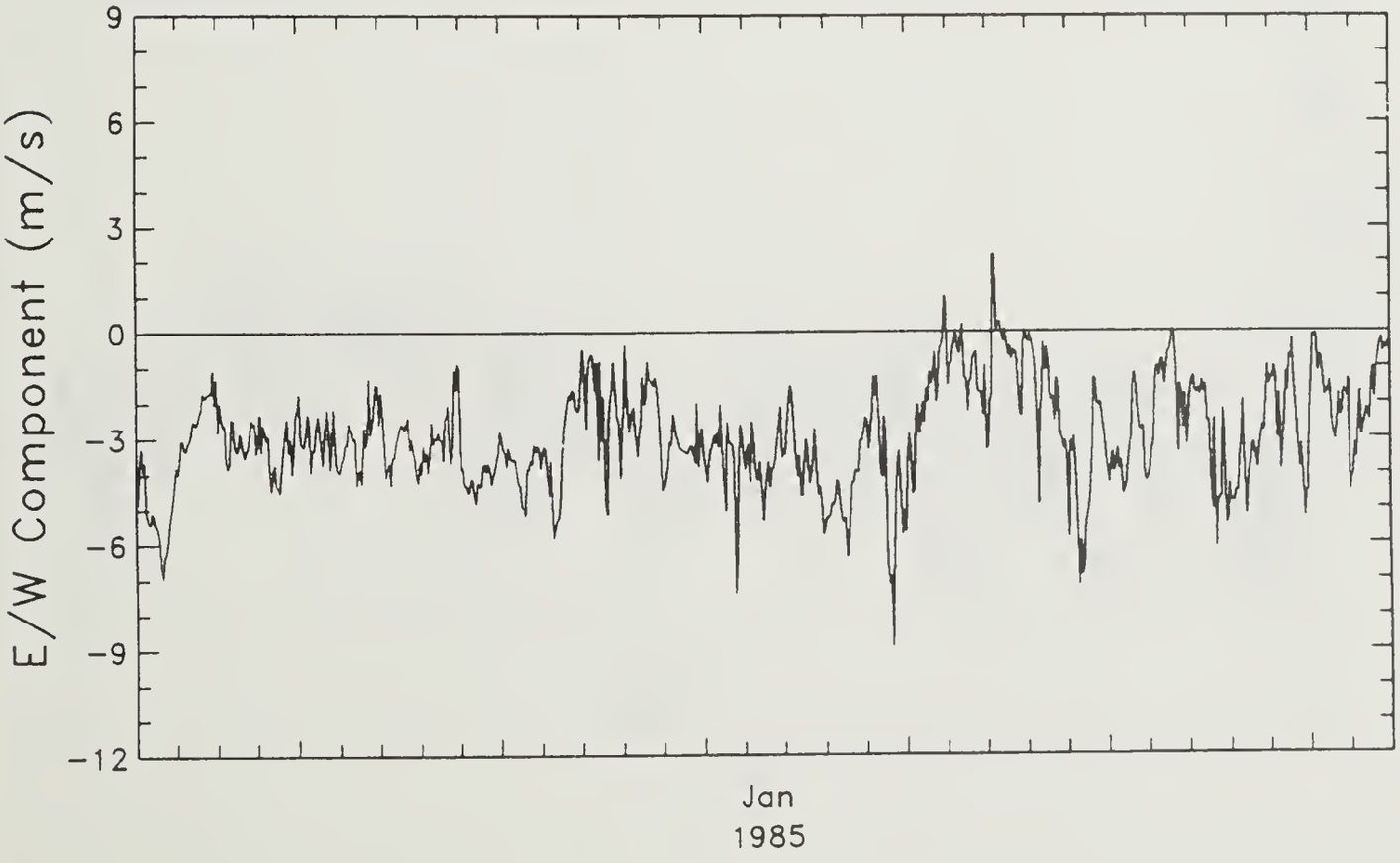
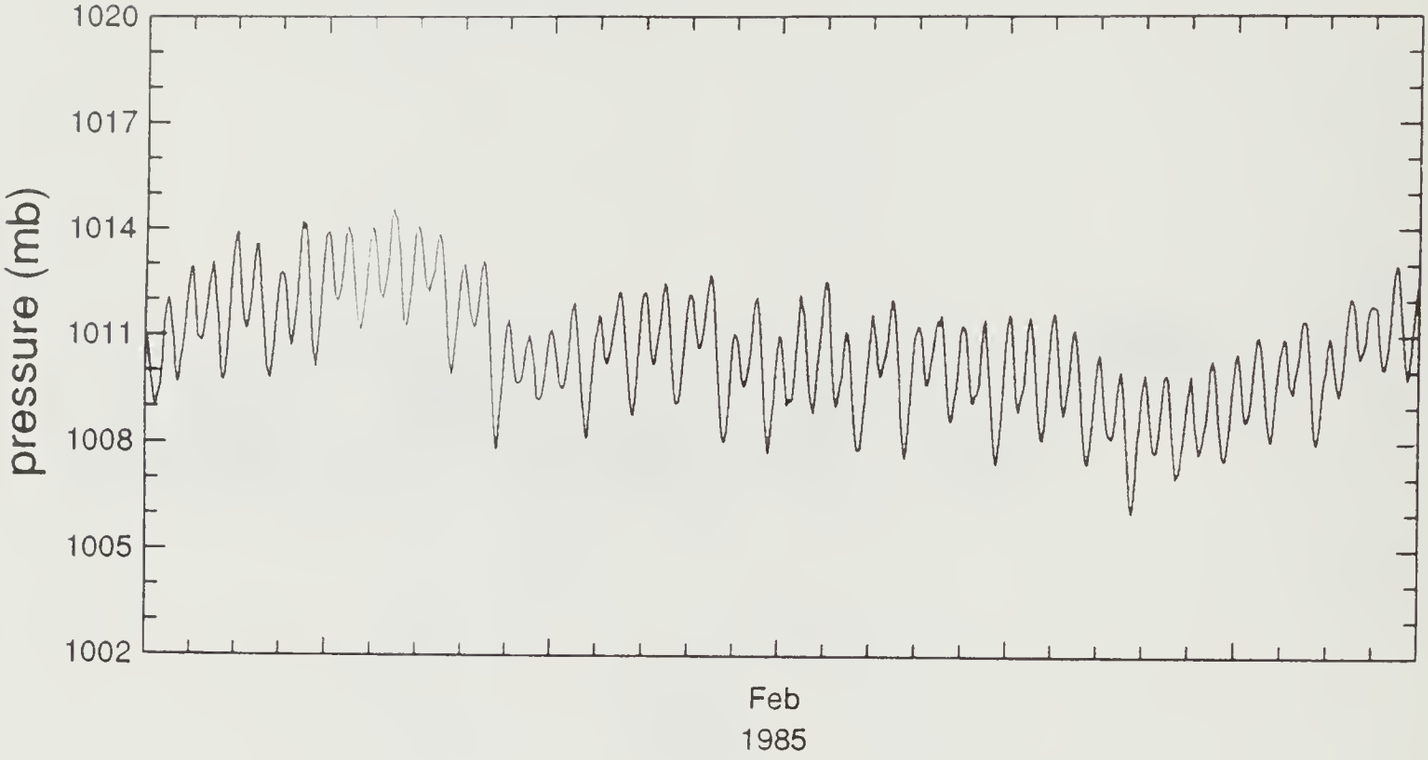


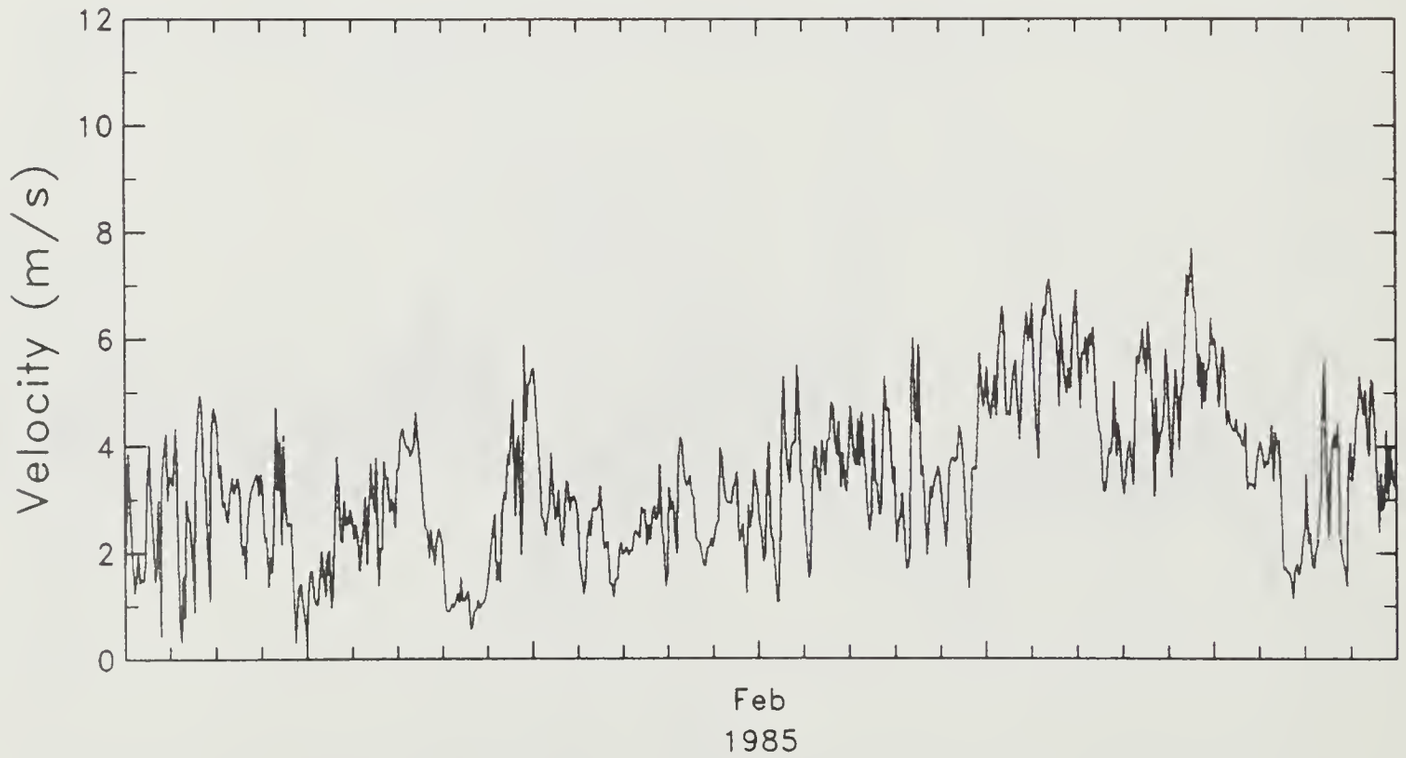


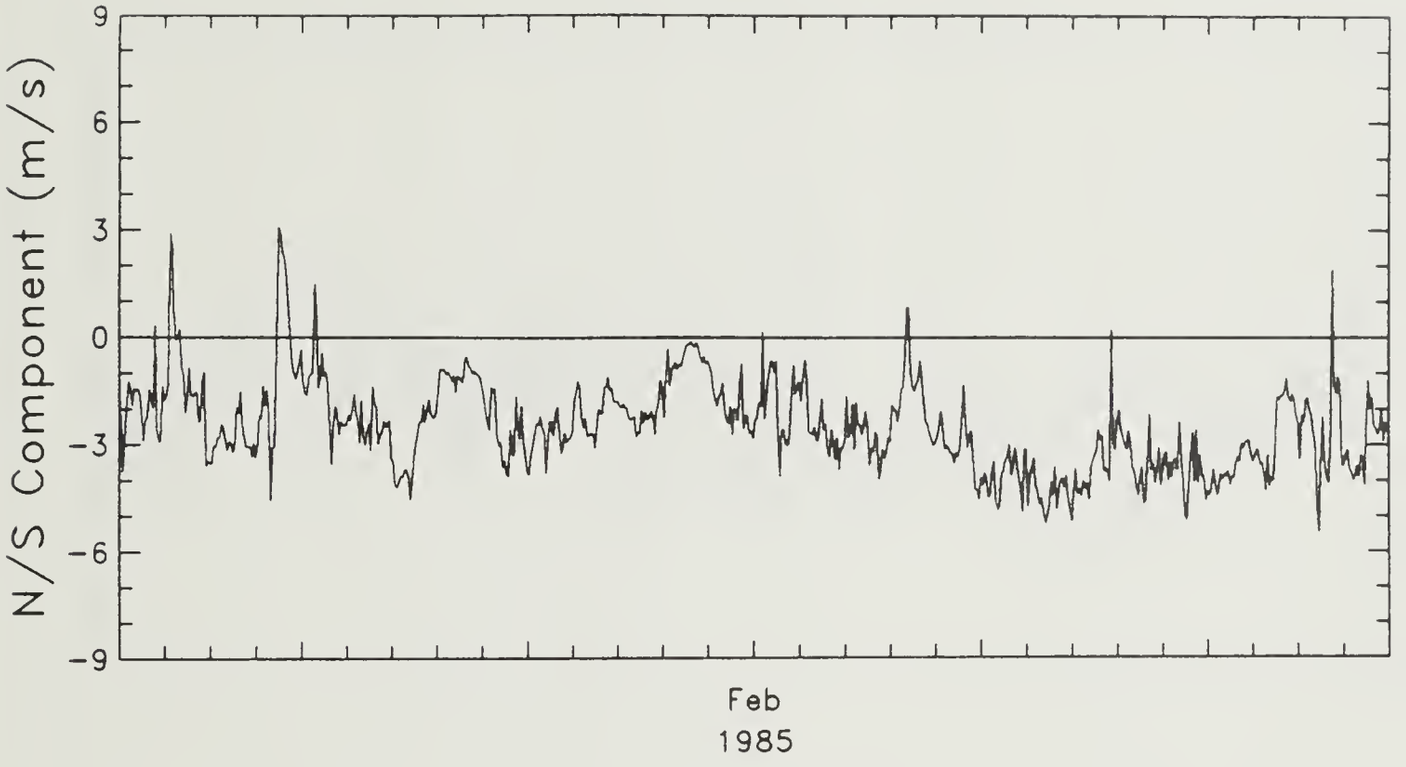

N/S Component (m/s)
9
6
3
0
-3
-6
-9
Jan
1985


E/W Component (m/s)
9
6
3
0
-3
-6
-9
-12
Jan
1985

February 1985



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3
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-3
-6
-9
Feb
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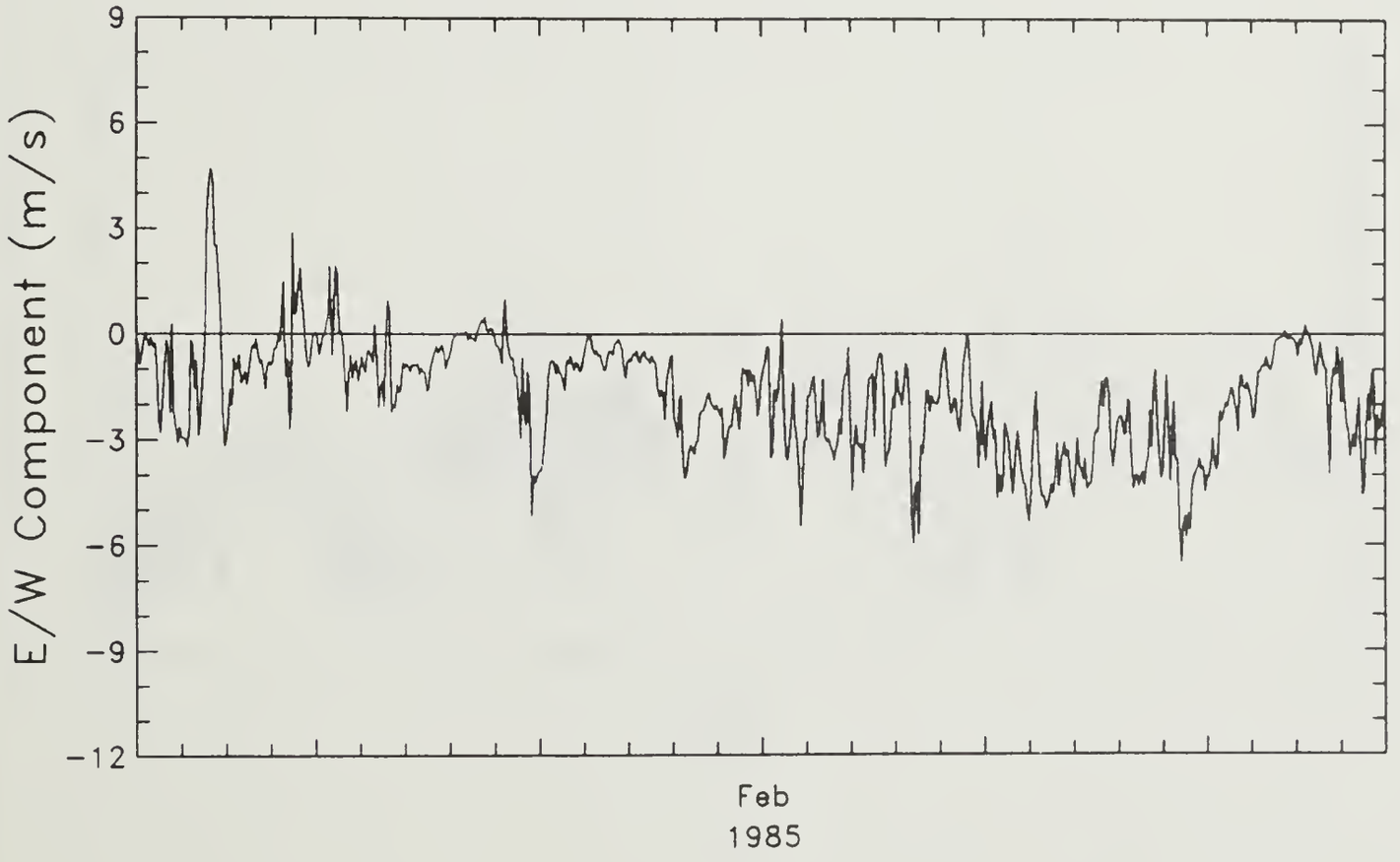
E/W Component (m/s)
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-9
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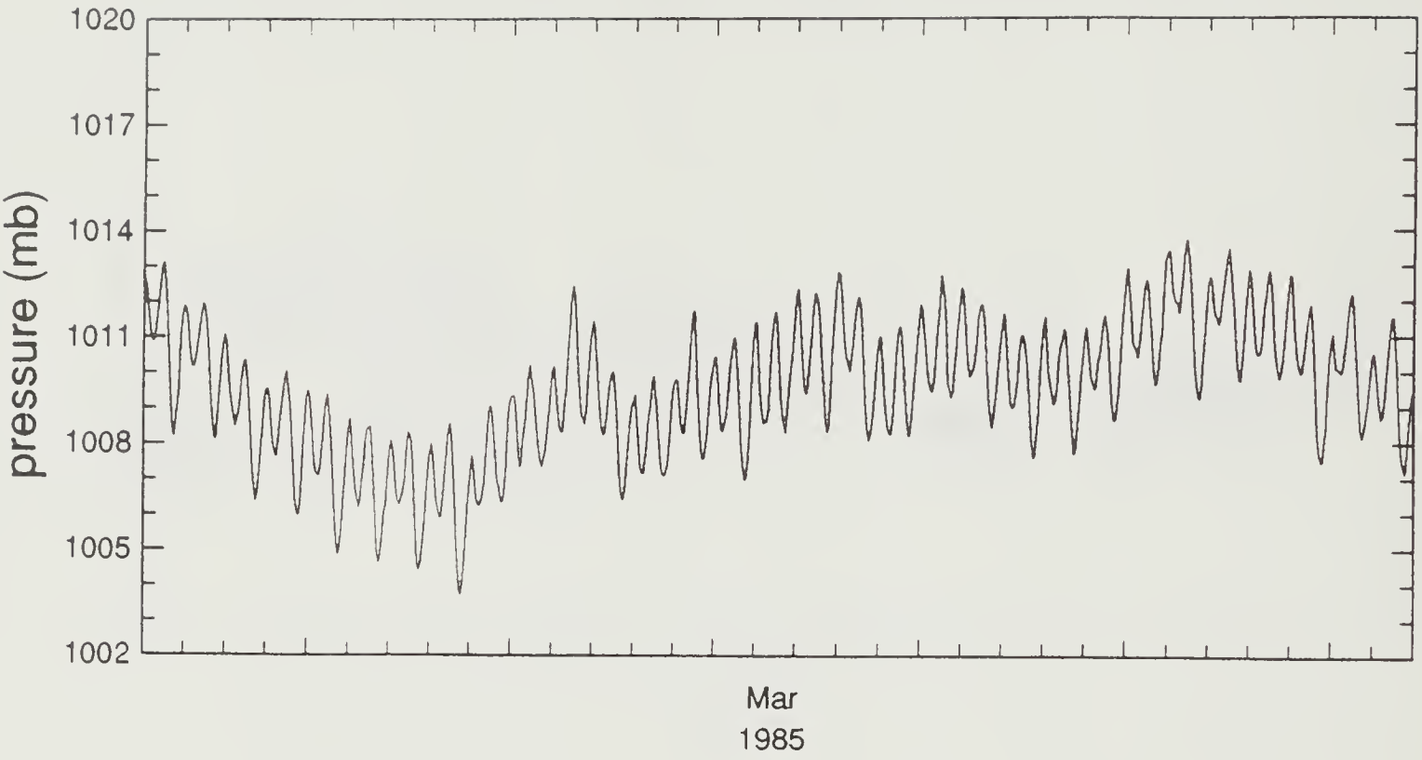
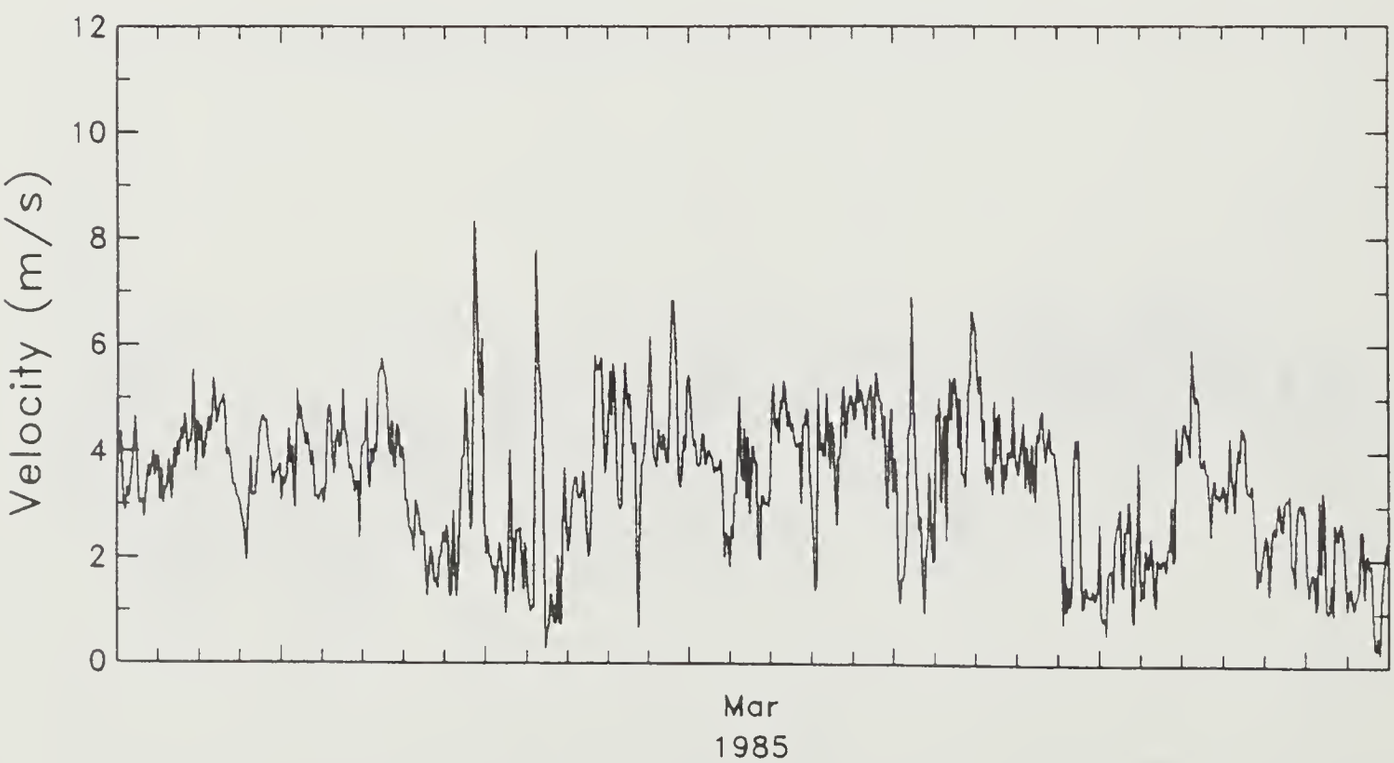
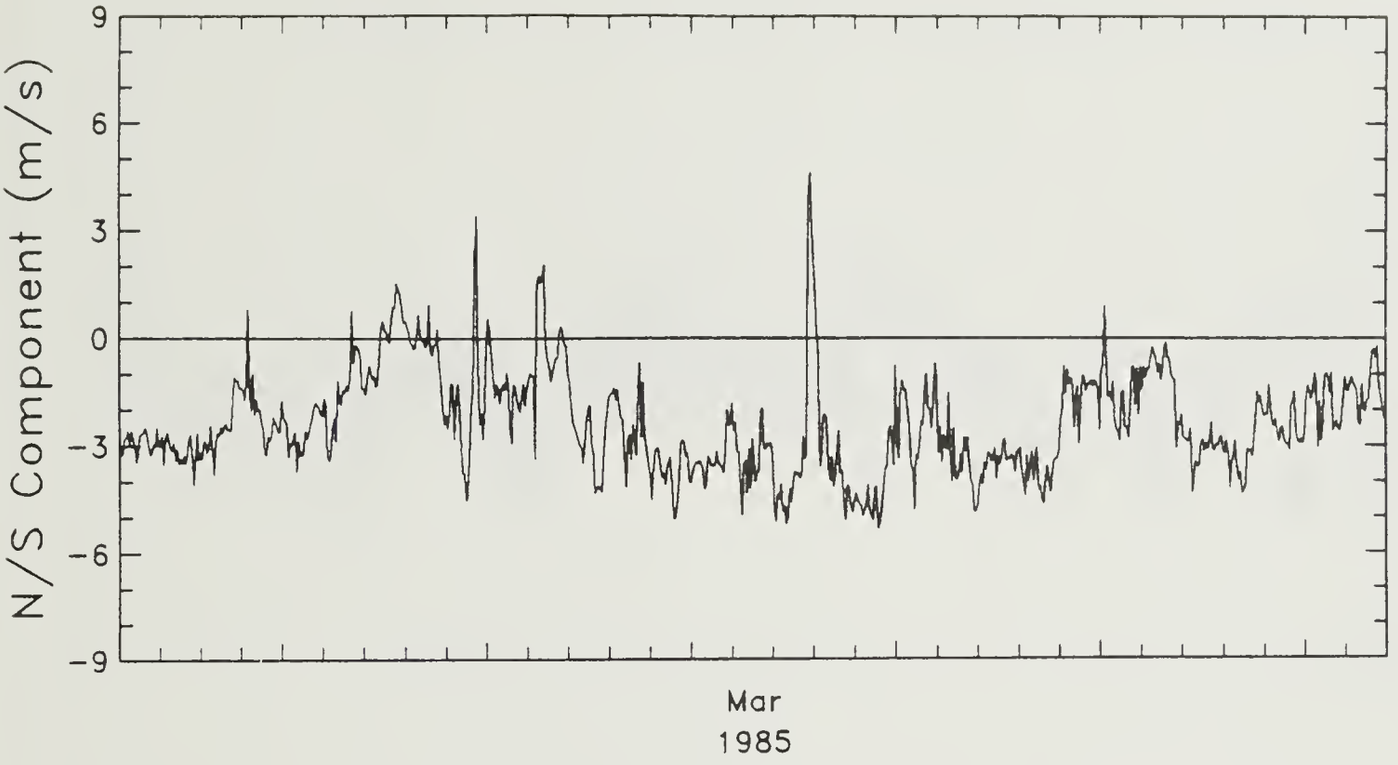
Feb
1985

March 1985


1020
1017
1014
1011
1008
1005
1002
pressure (mb)
Mar
1985


12
10
8
6
4
2
0
Velocity (m/s)
Mar
1985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3
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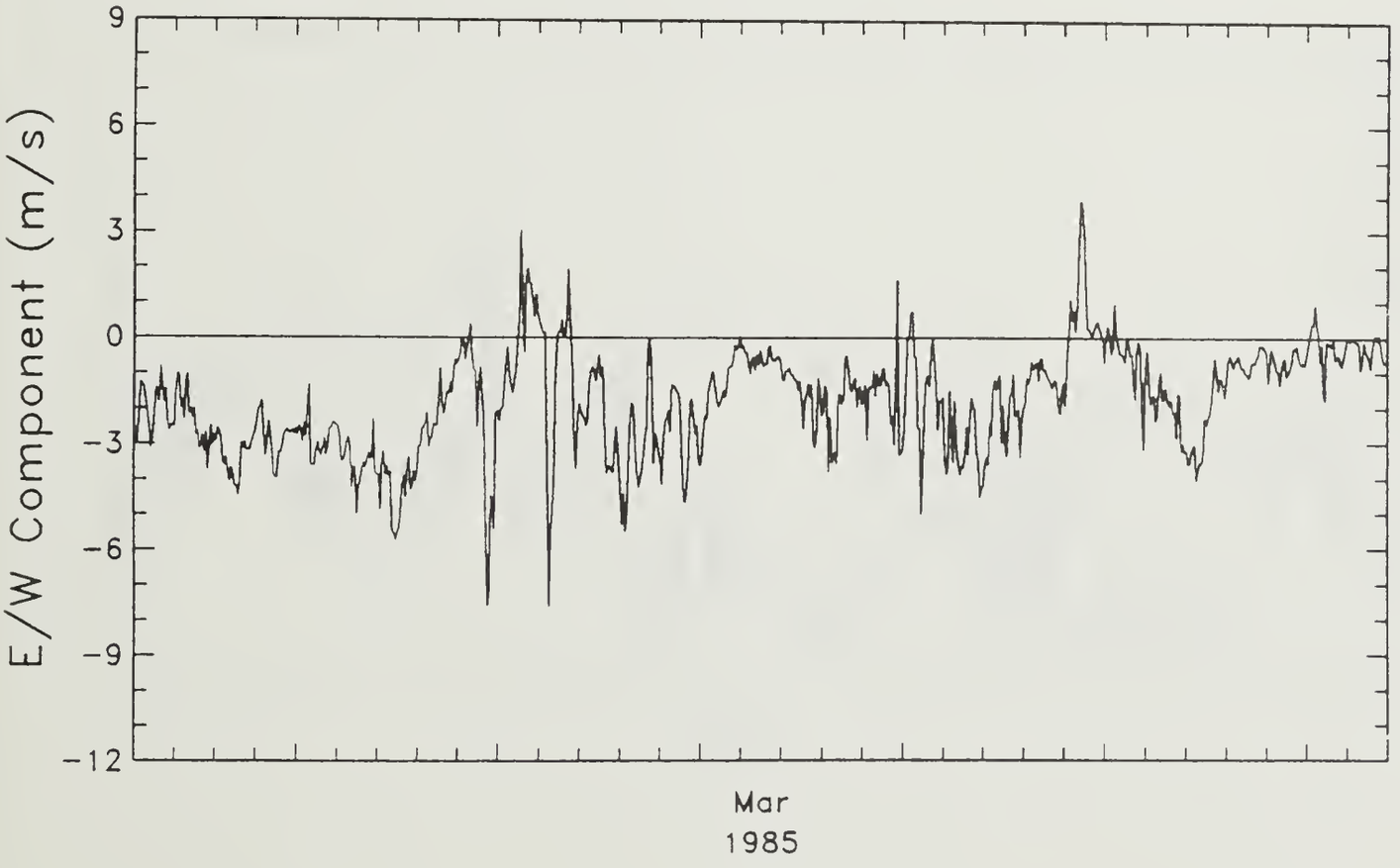
-3
-6
-9
Mar
1985


E/W Component (m/s)
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6
3
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-3
-6
-9
-12
Mar
1985

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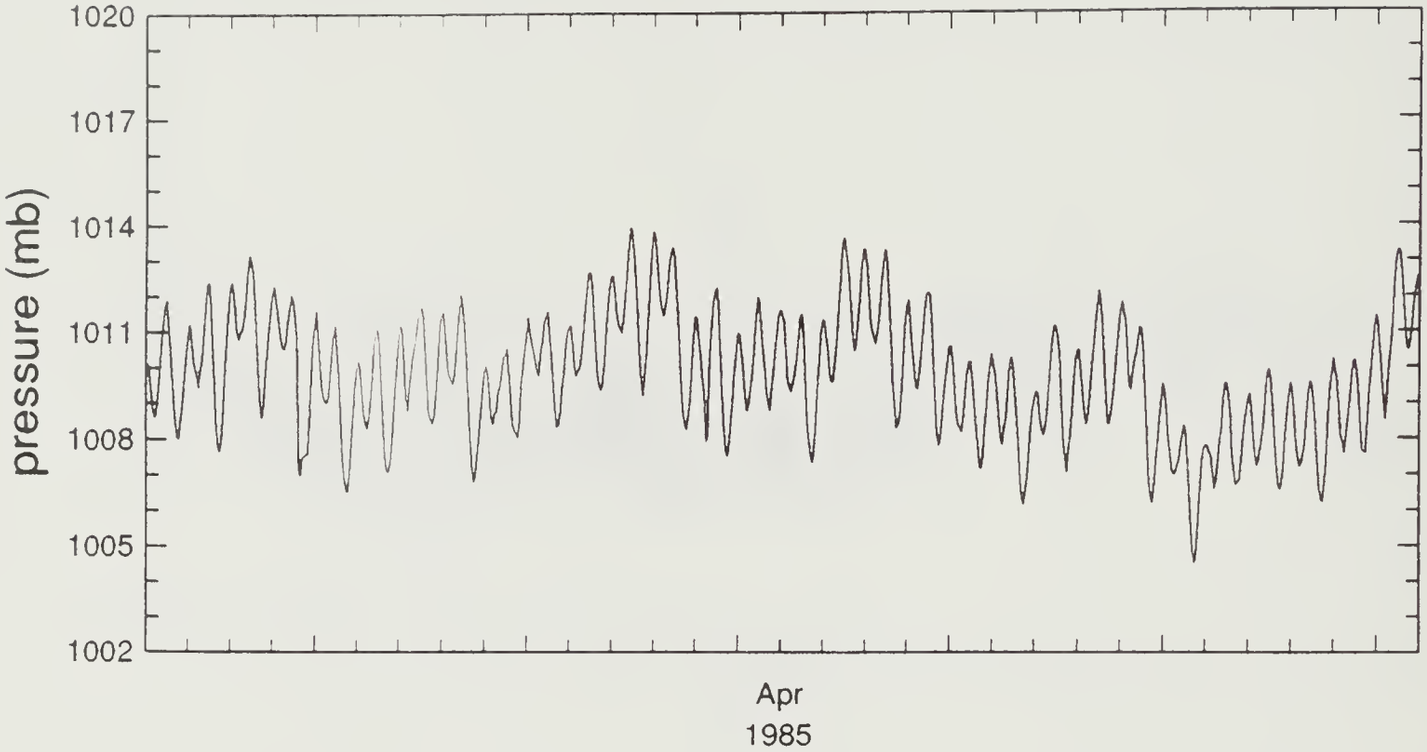
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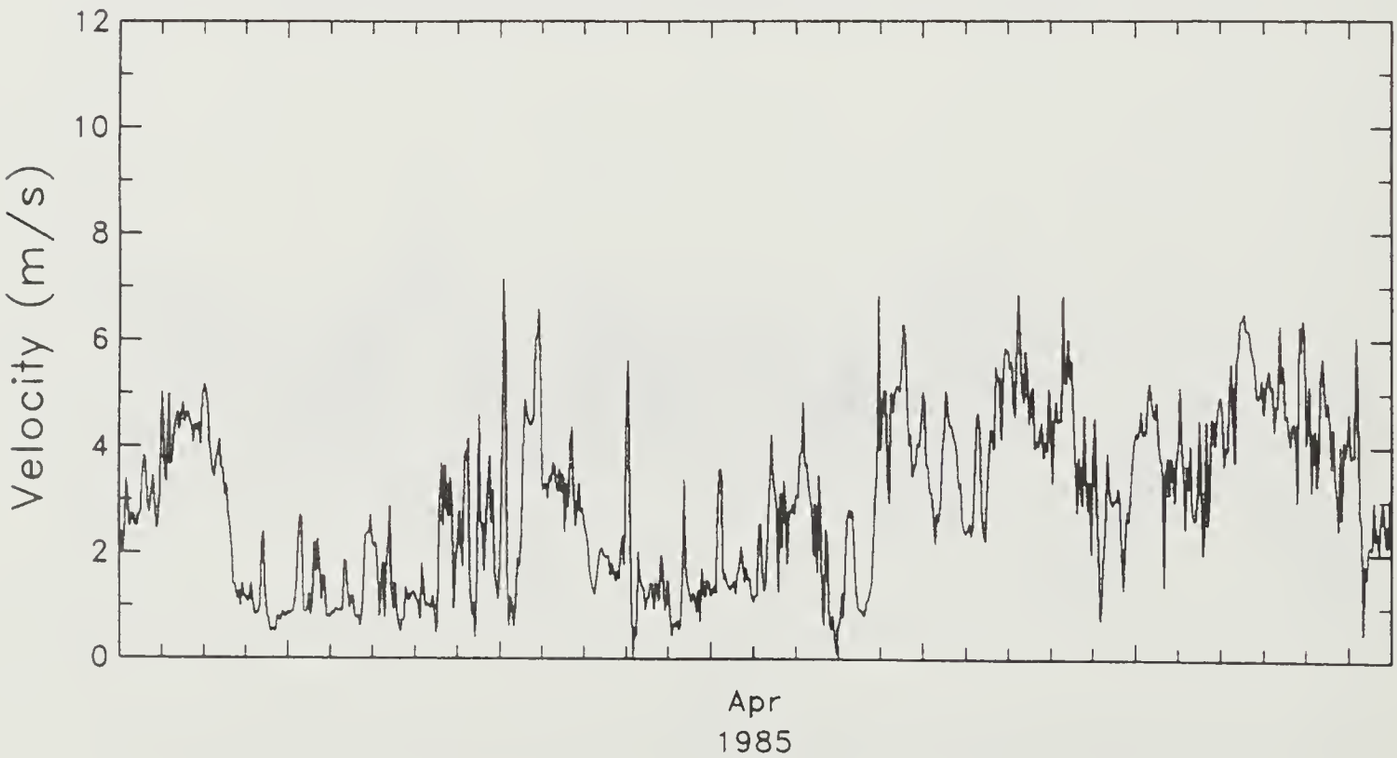
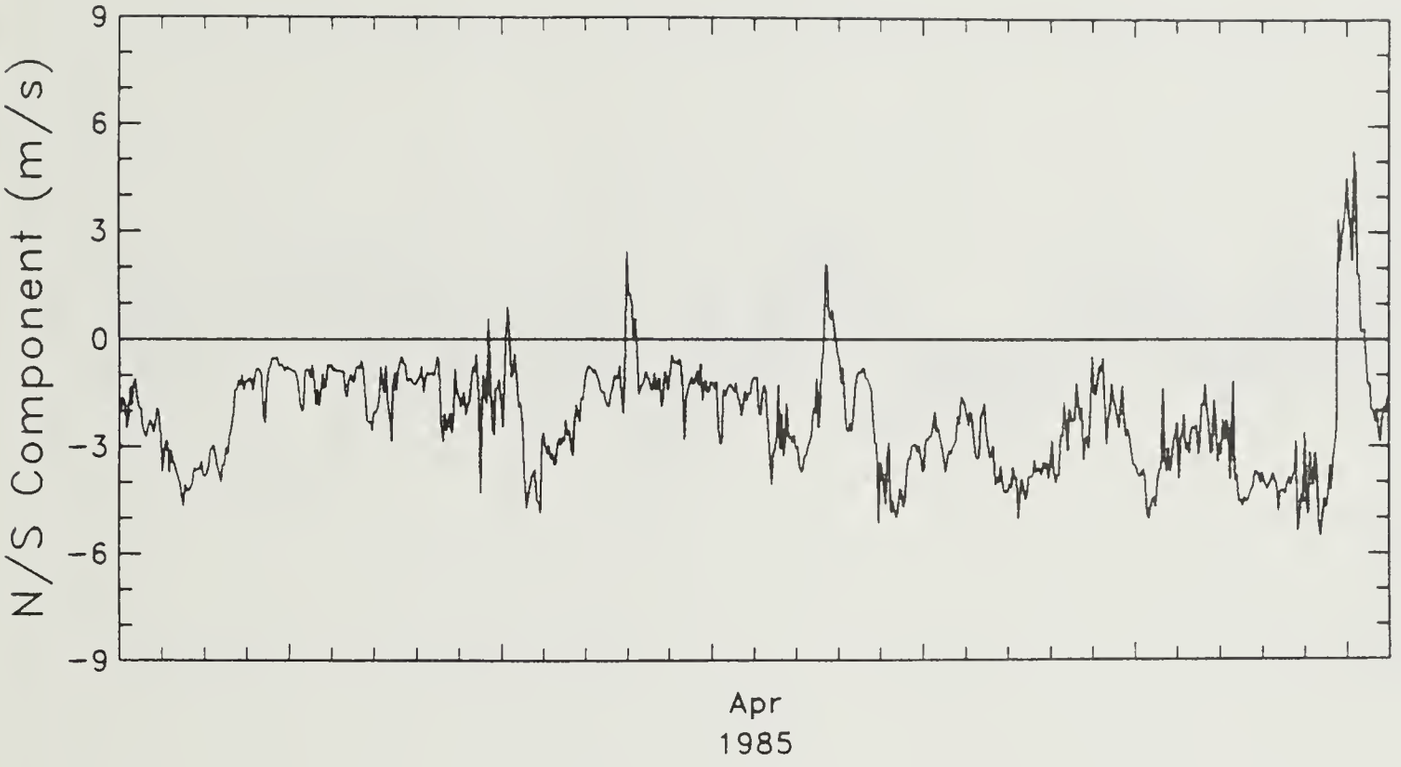
1017
1014
1011
1008
1005
1002
pressure (mb)
Apr
1985


12
10
8
6
4
2
0
Velocity (m/s)
Apr
1985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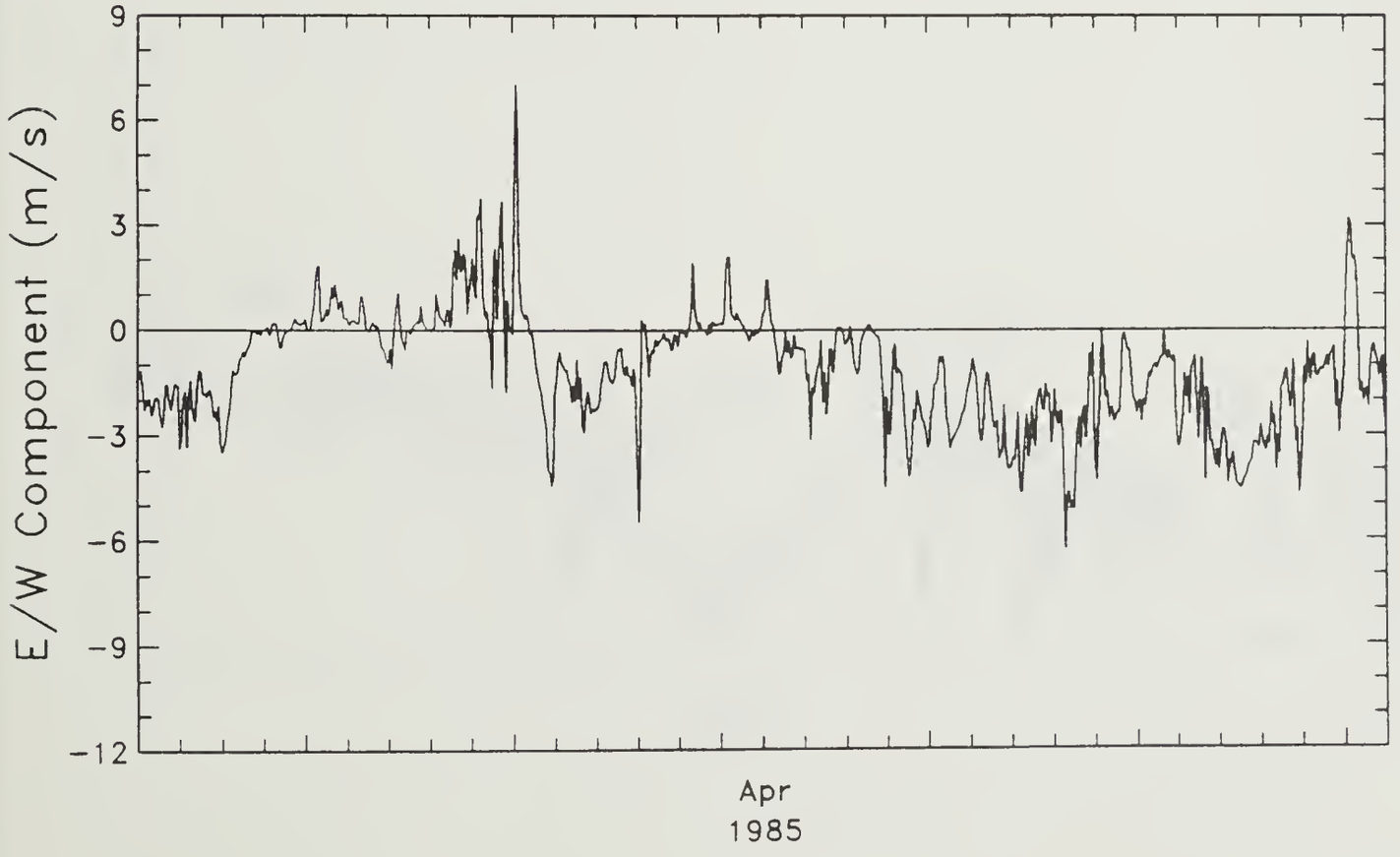
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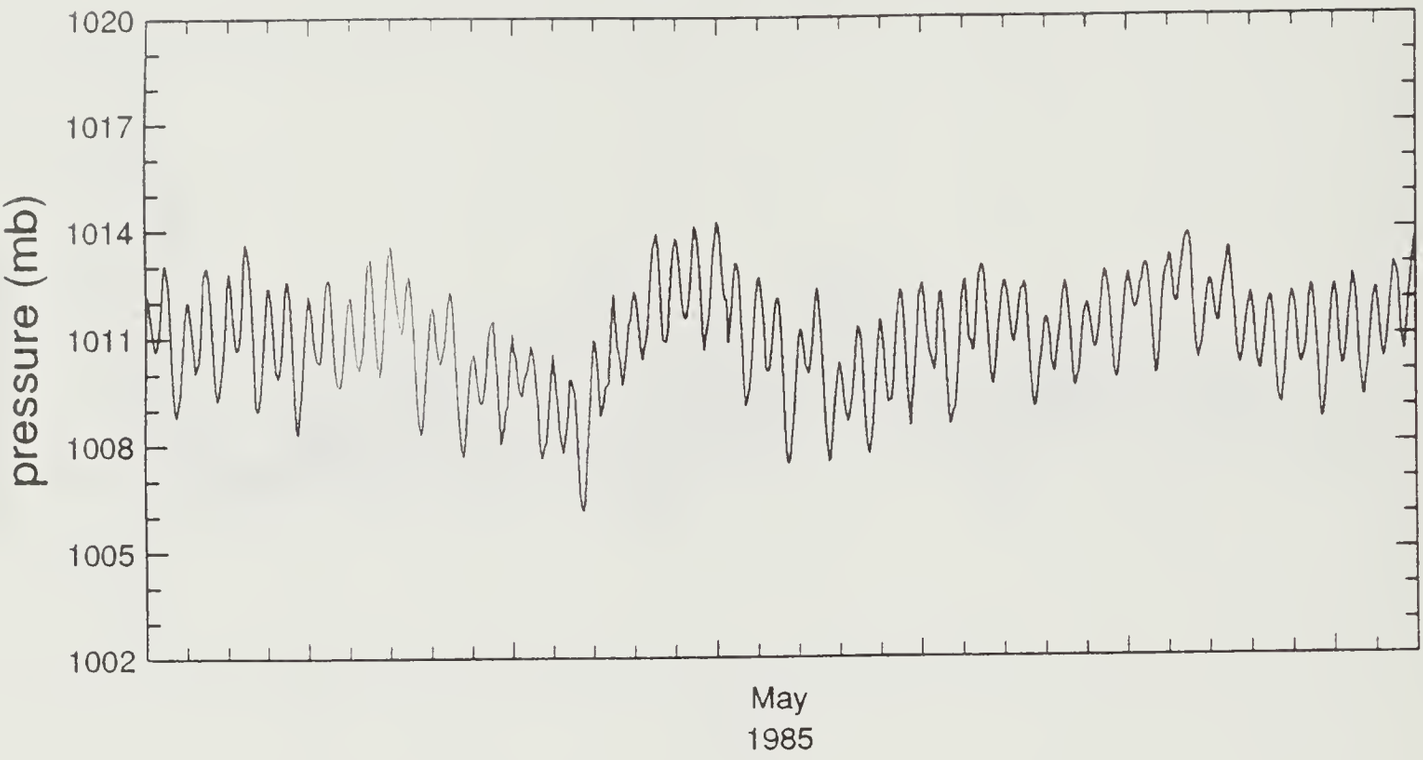
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1017
1014
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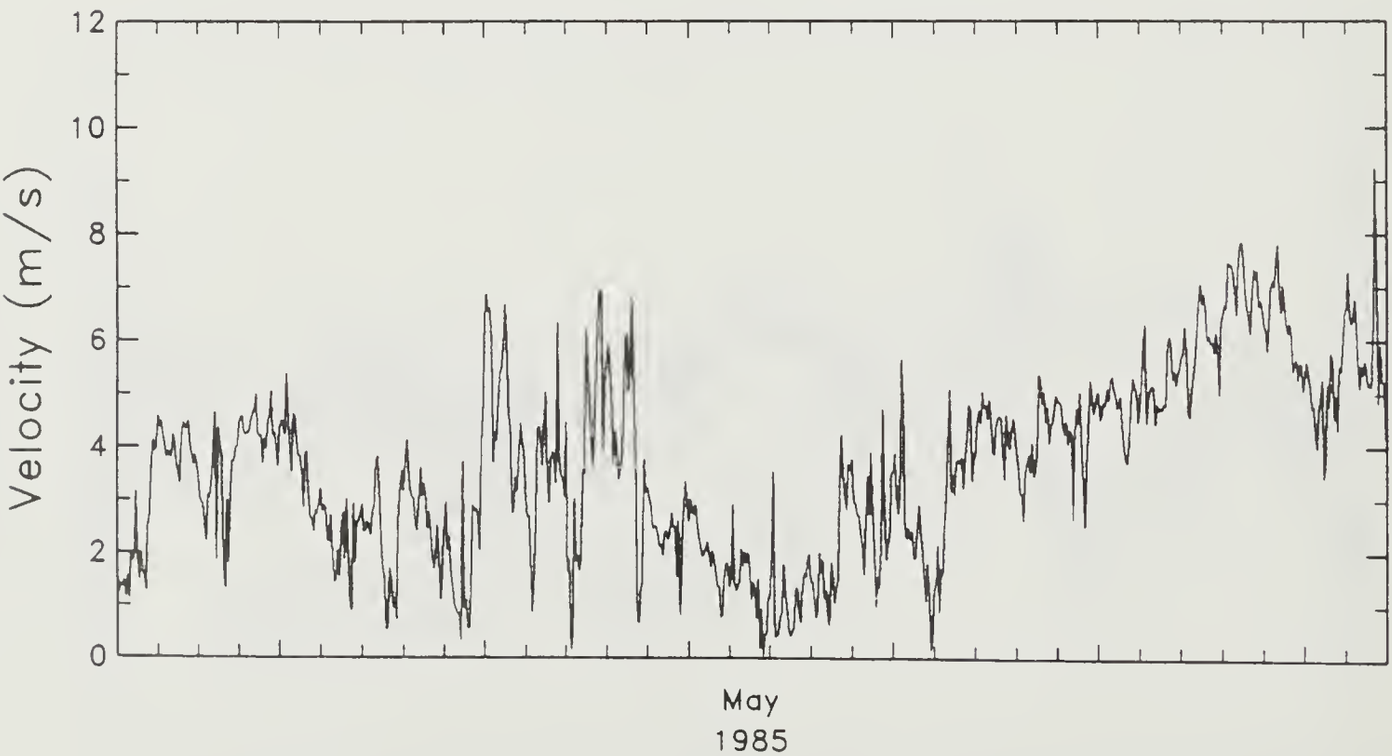
pressure (mb)
May
1985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8
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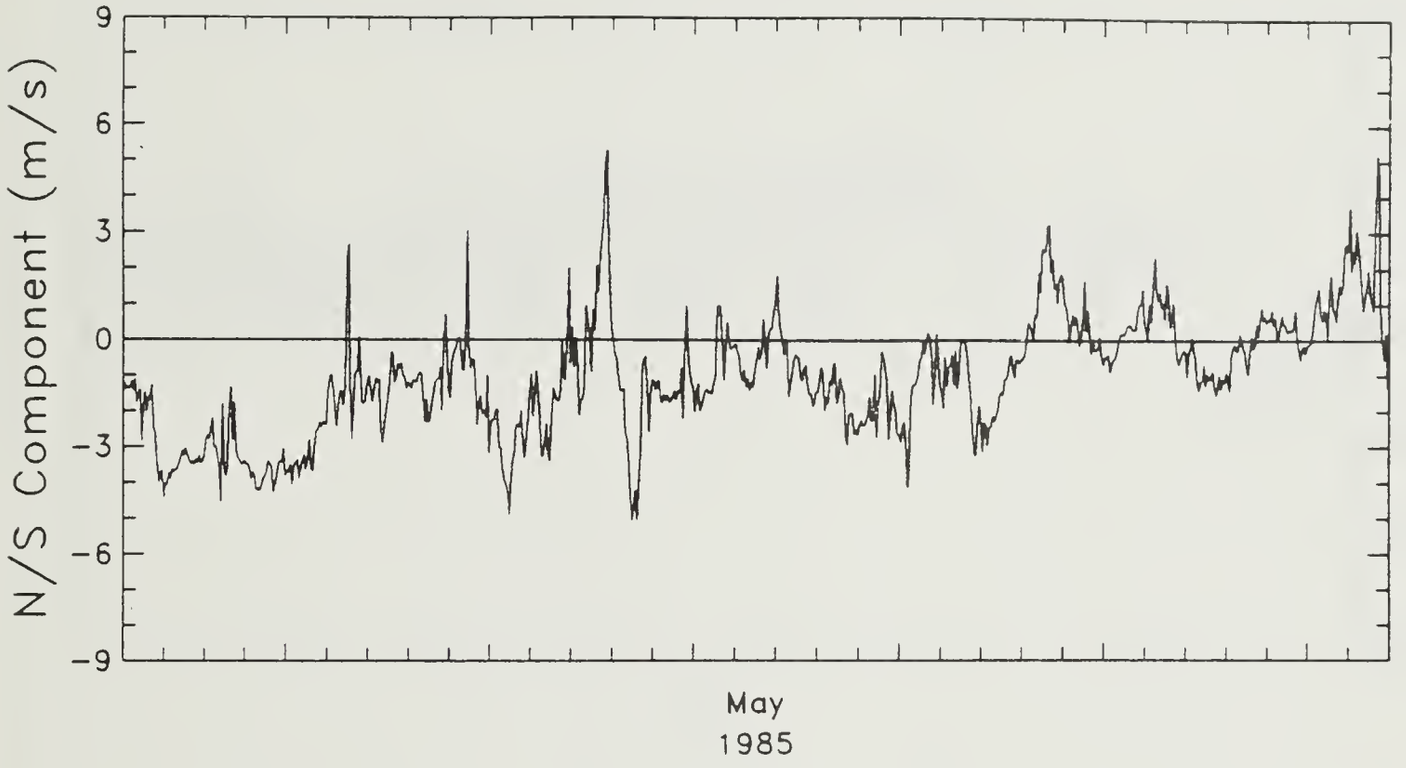
0
Velocity (m/s)
May
1985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May
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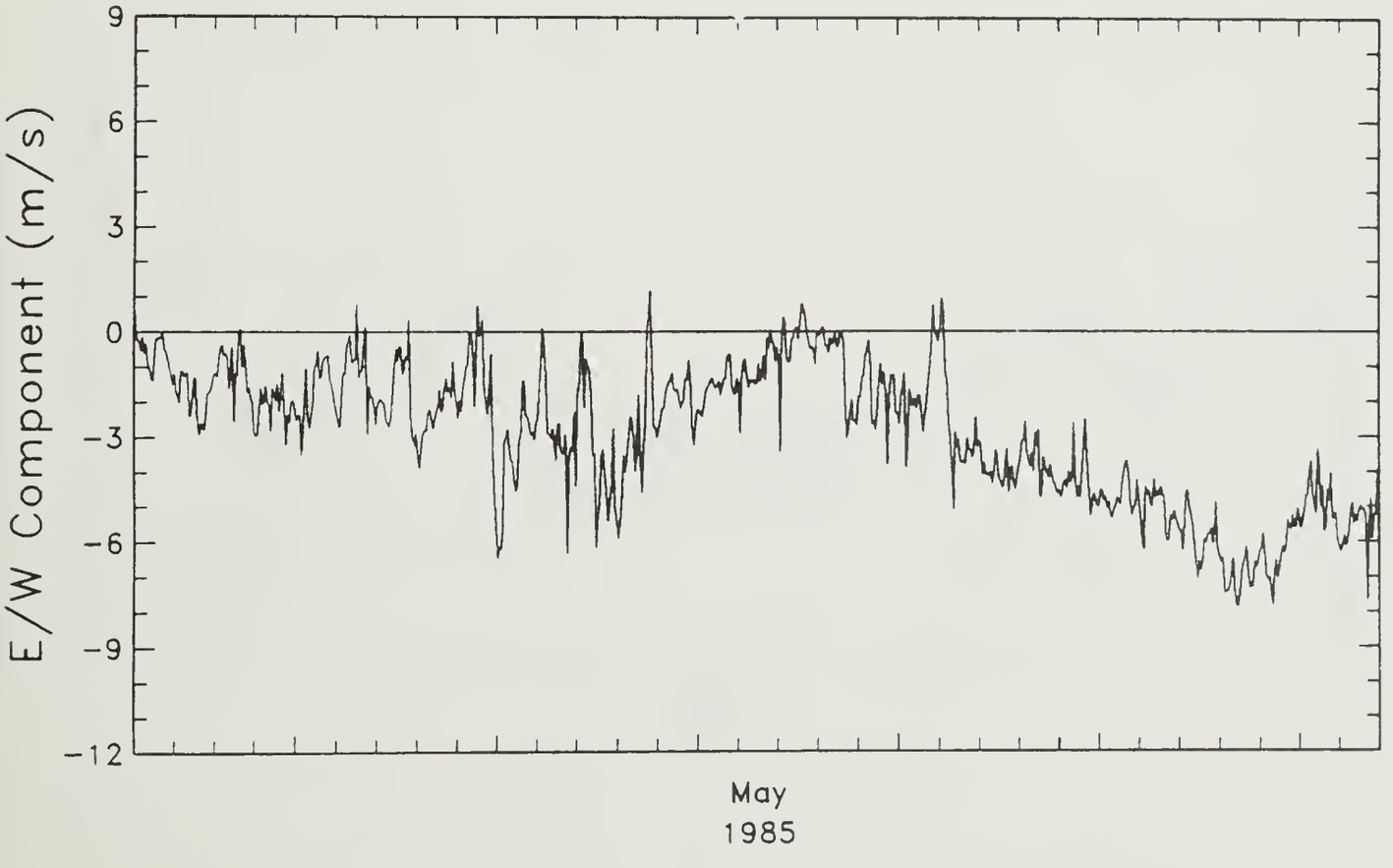
E/W Component (m/s)
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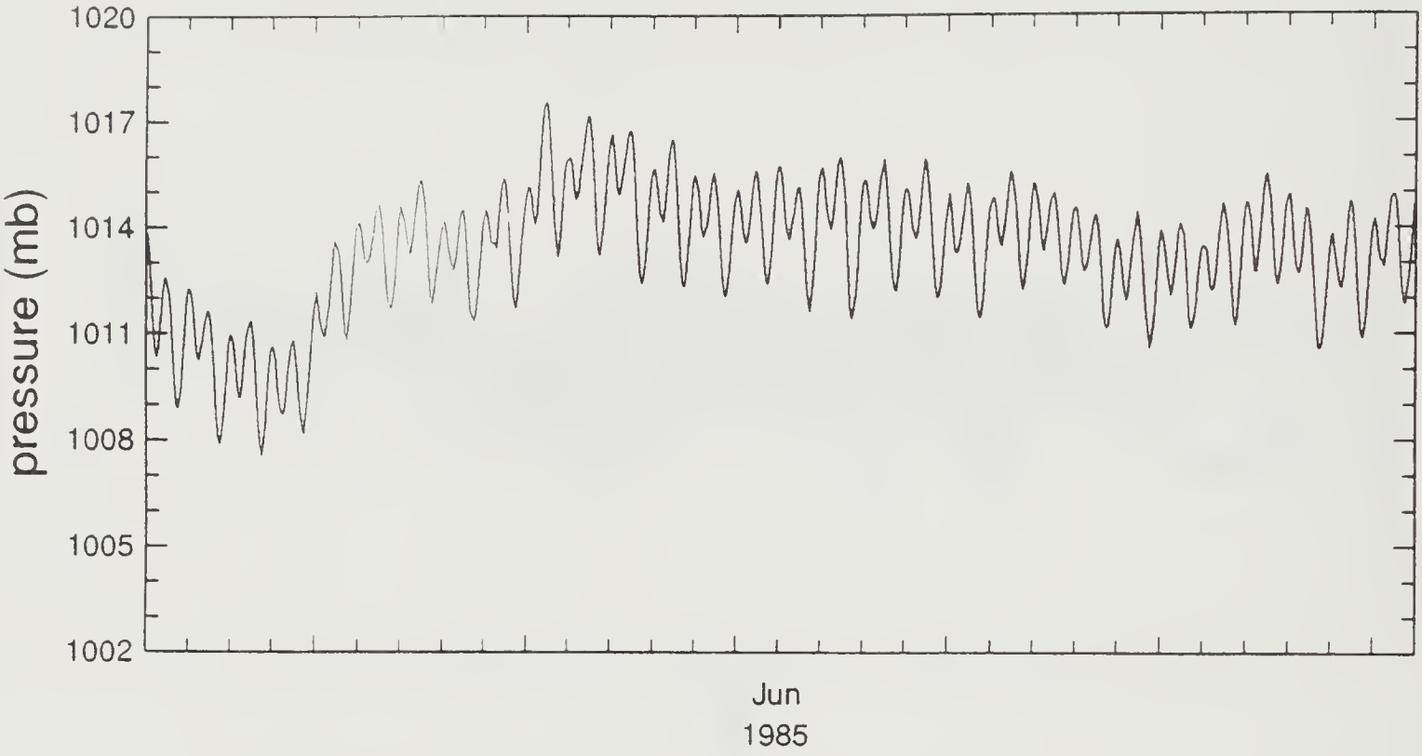
-6
-9
-12
May
1985

June 1985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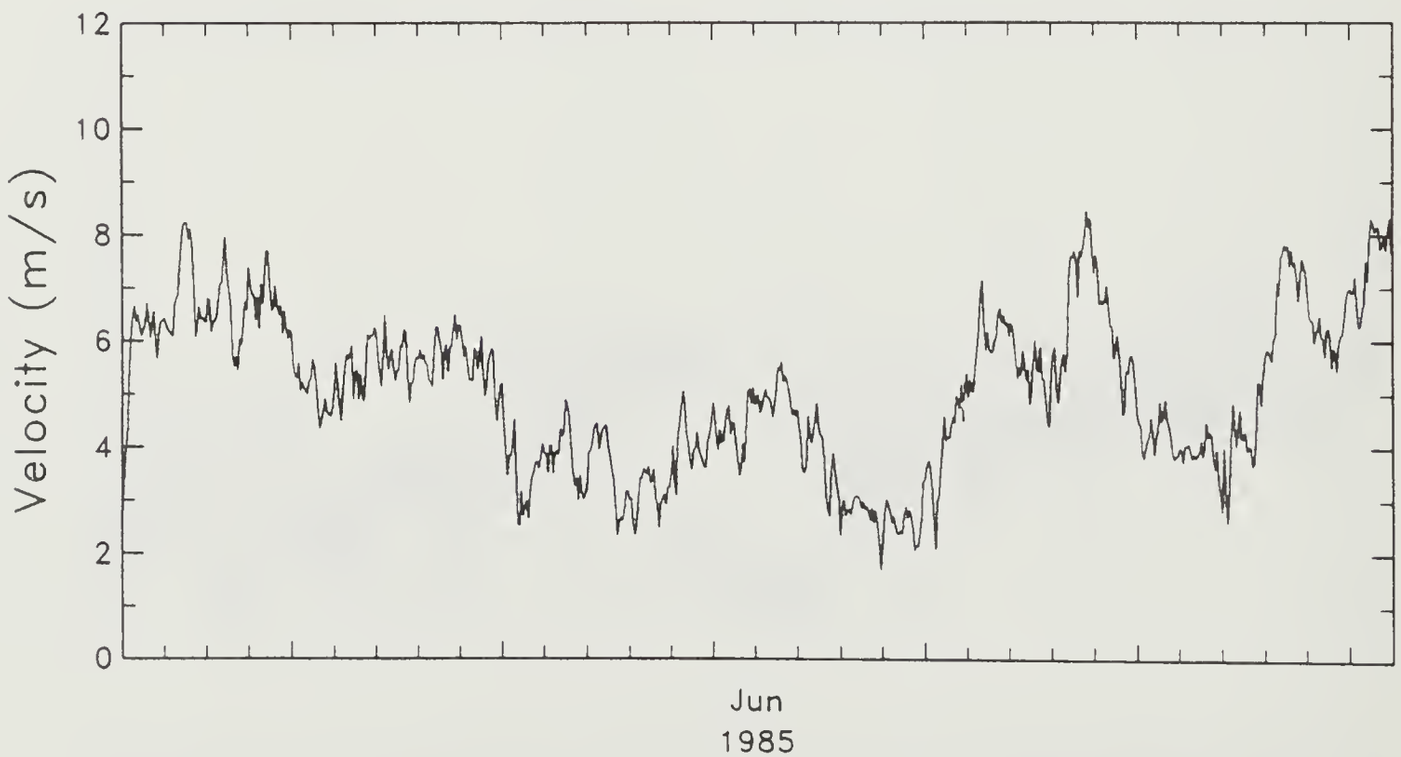
1017
1014
1011
1008
1005
1002
pressure (mb)
Jun
1985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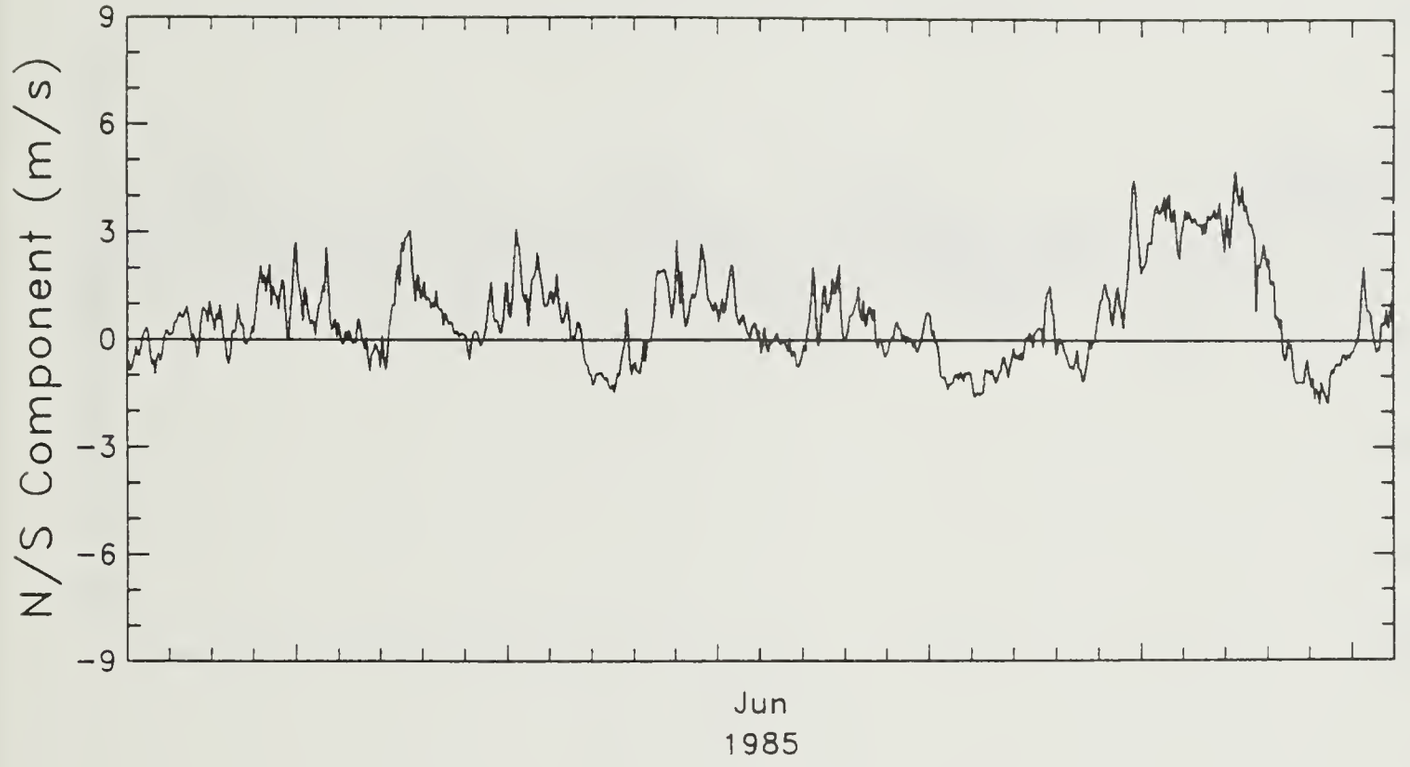
10
8
6
4
2
0
Velocity (m/s)
Jun
1985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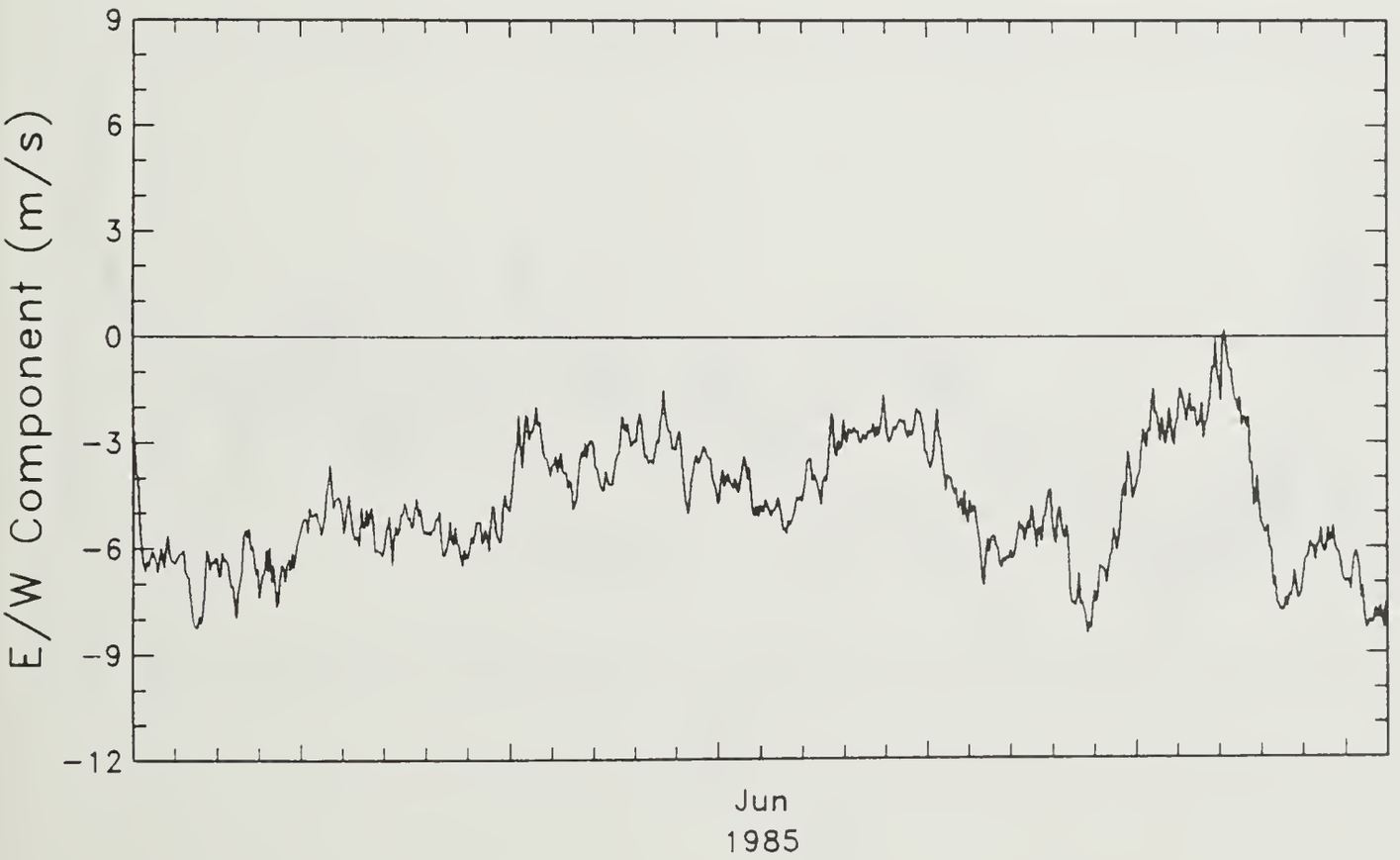
6
3
0
-3
-6
-9
N/S Component (m/s)
Jun
1985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6
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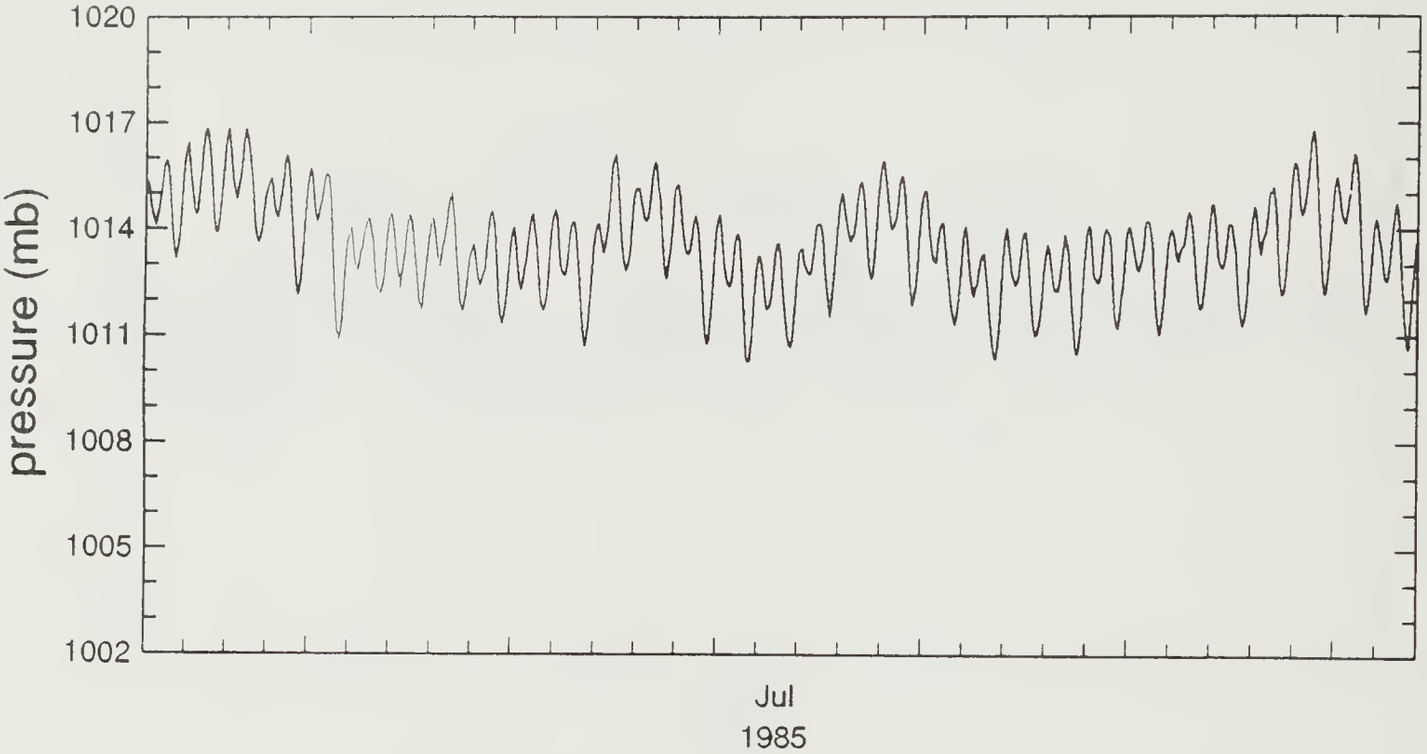
0
-3
-6
-9
-12
E/W Component (m/s)
Jun
1985

July 1985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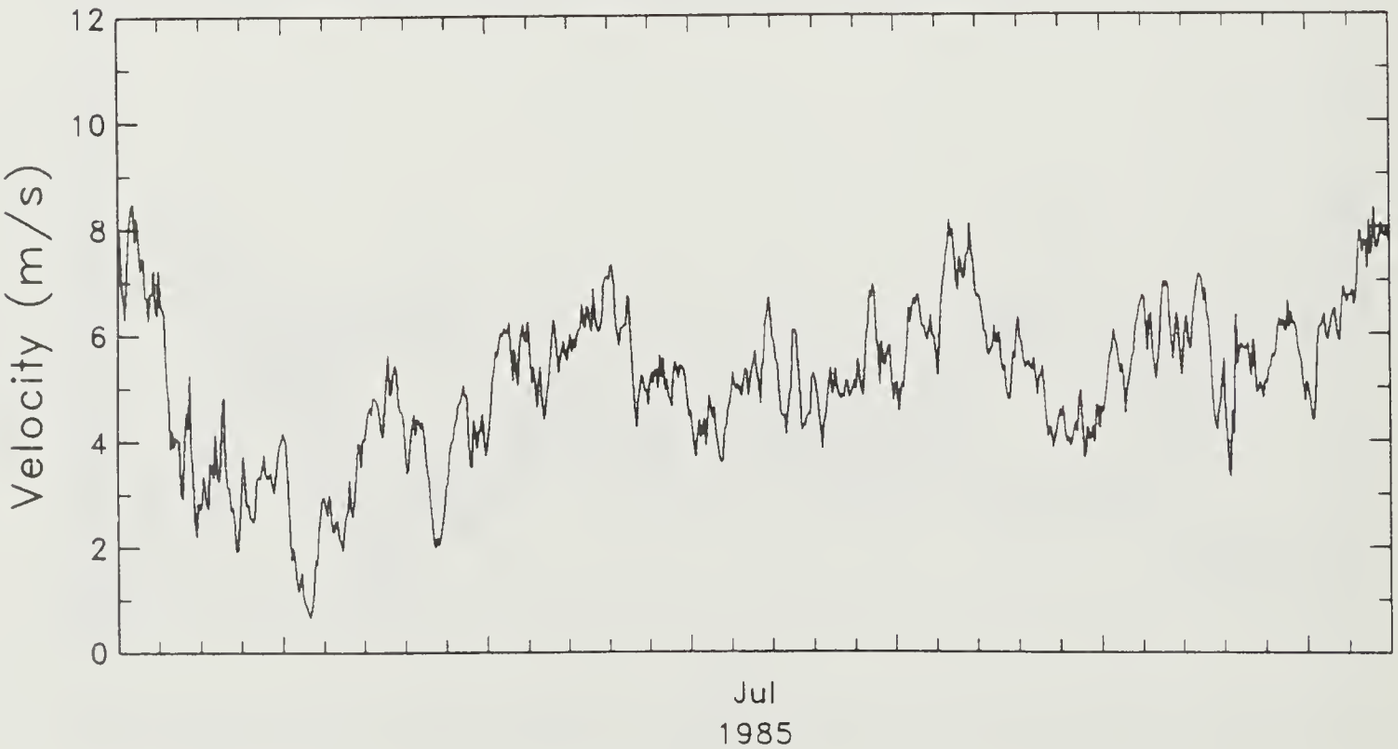
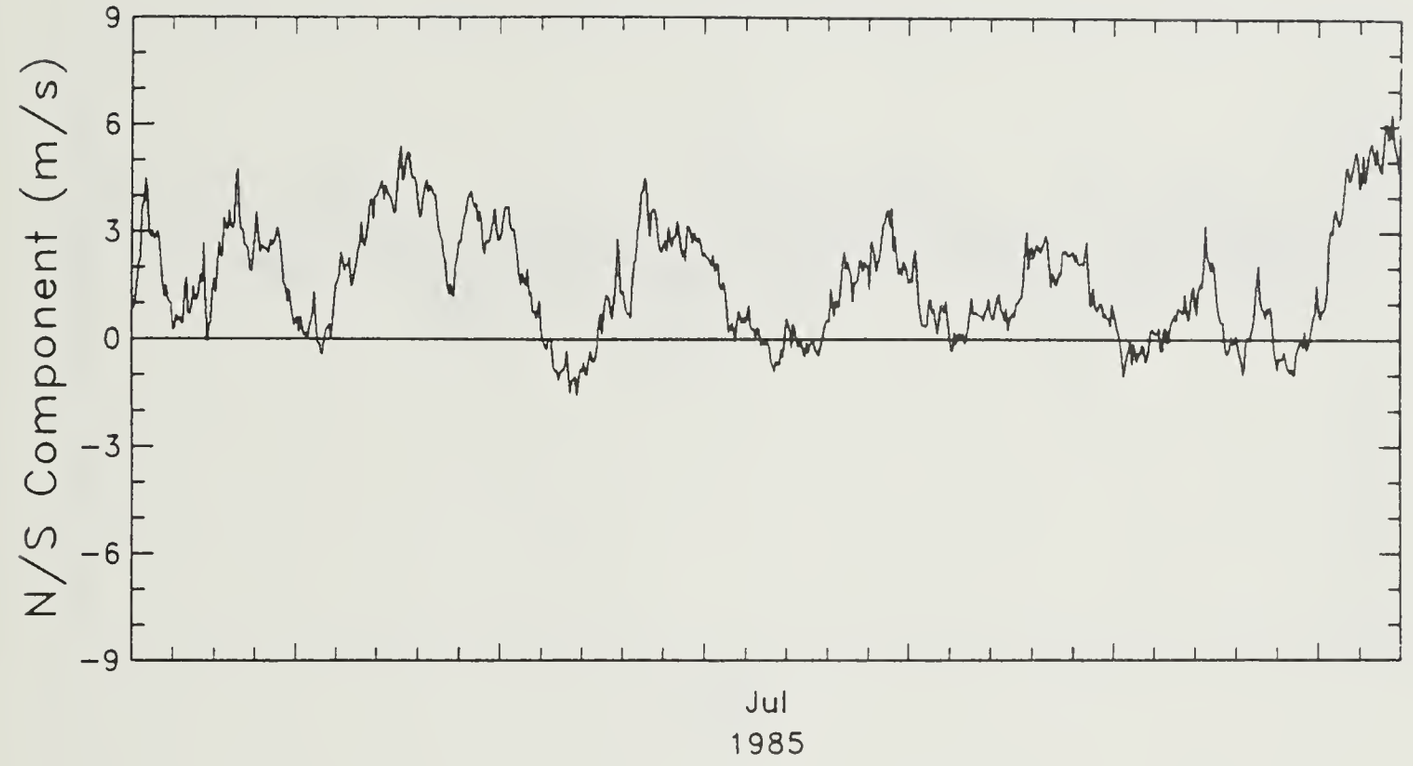
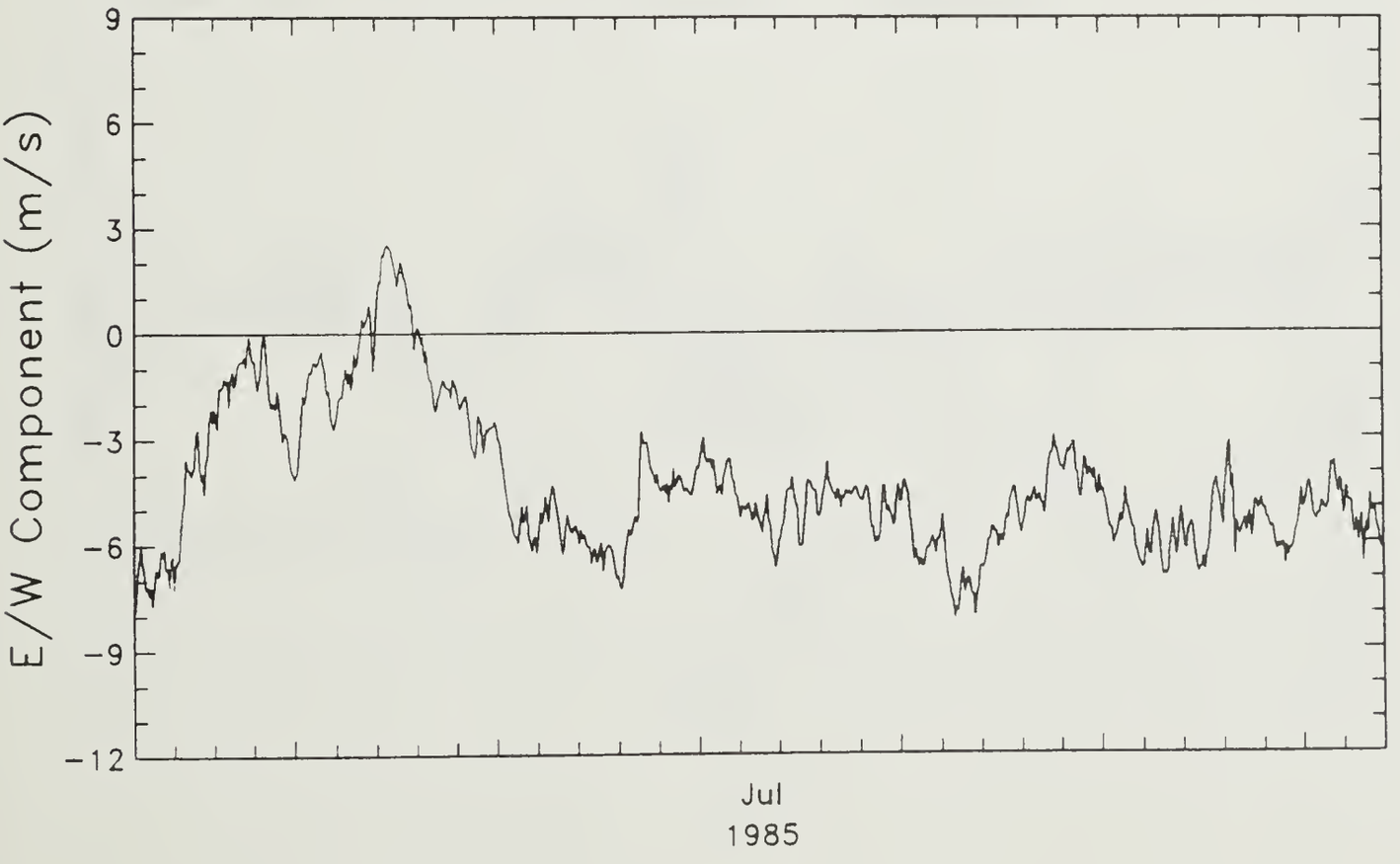
1017
1014
1011
1008
1005
1002
pressure (mb)
Jul
1985


12
10
8
6
4
2
0
Velocity (m/s)
Jul
1985


9
6
3
0
-3
-6
-9
N/S Component (m/s)
Jul
1985


9
6
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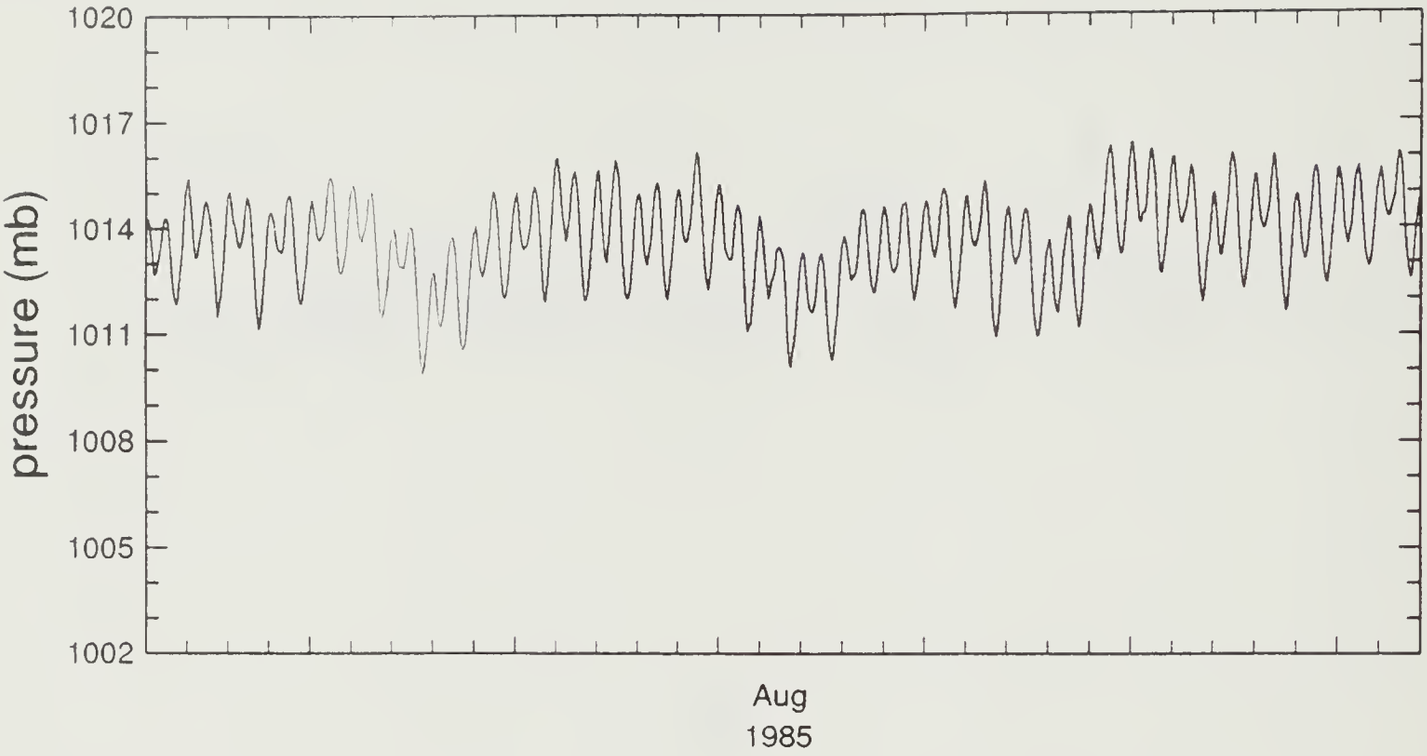
-3
-6
-9
-12
E/W Component (m/s)
Jul
1985

August 1985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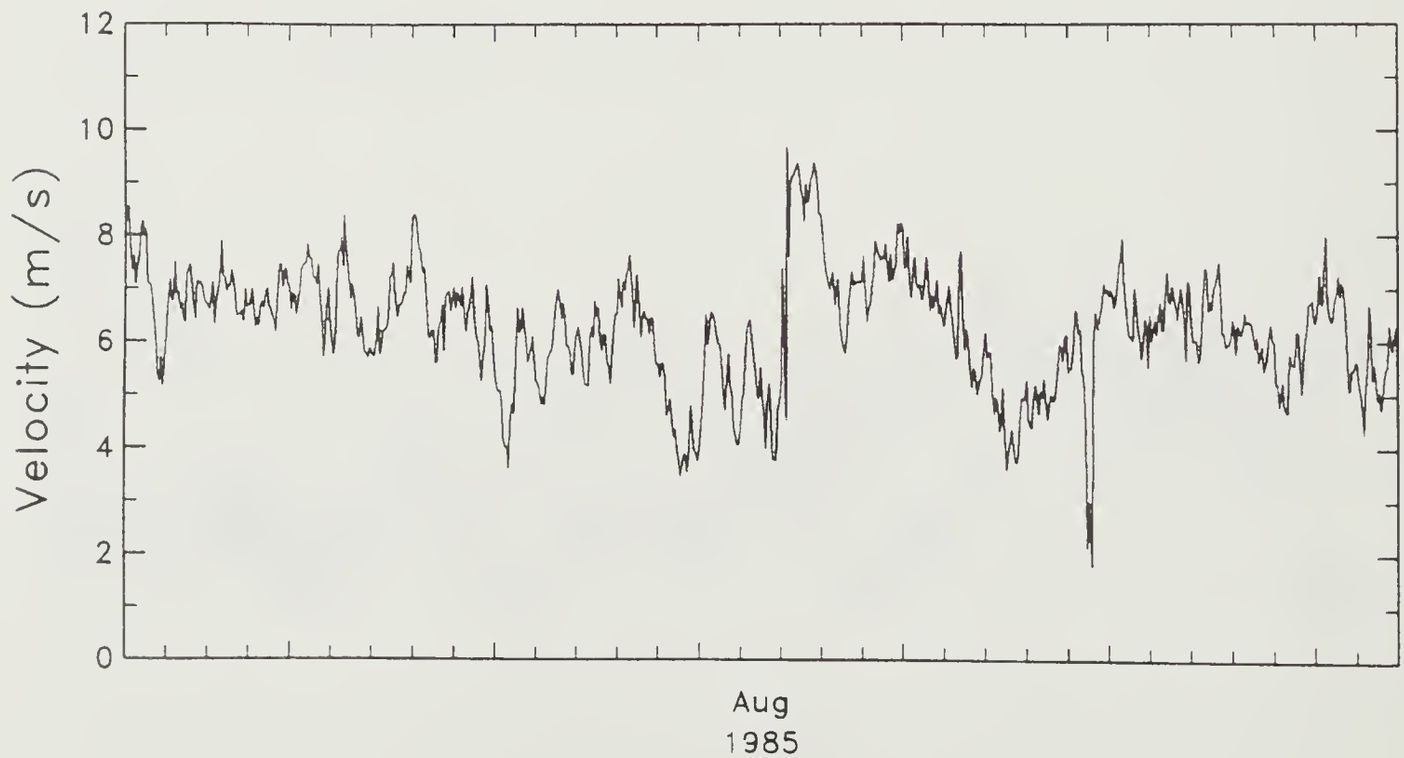
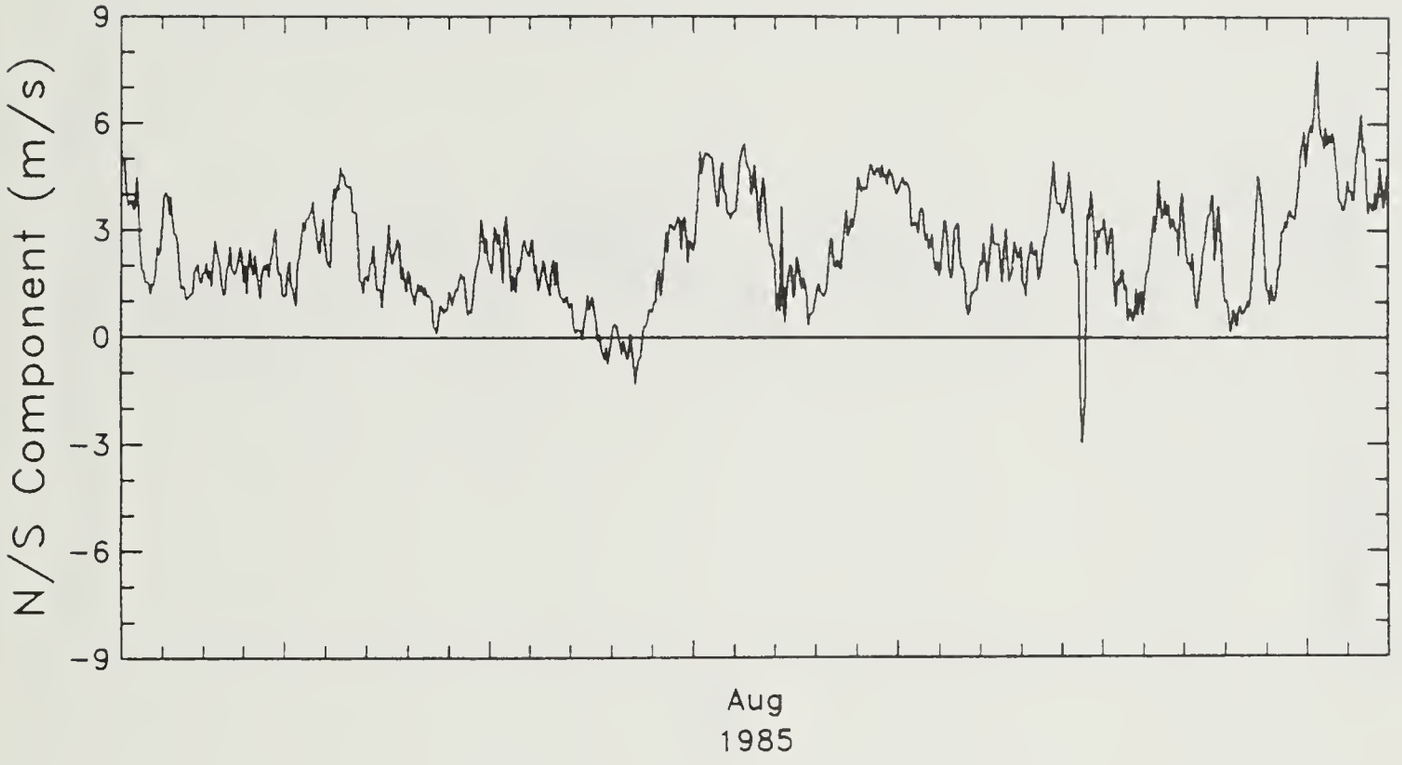
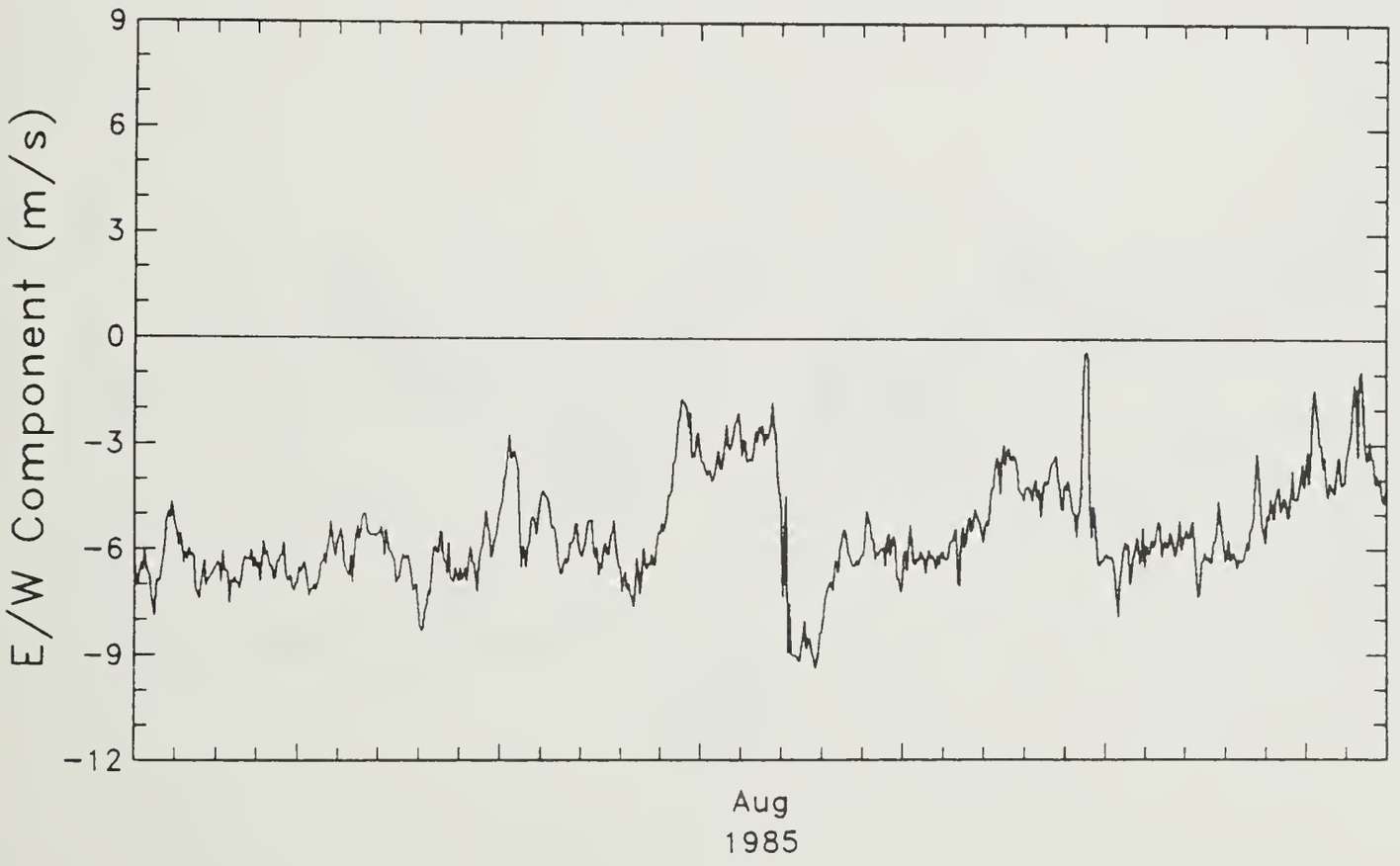
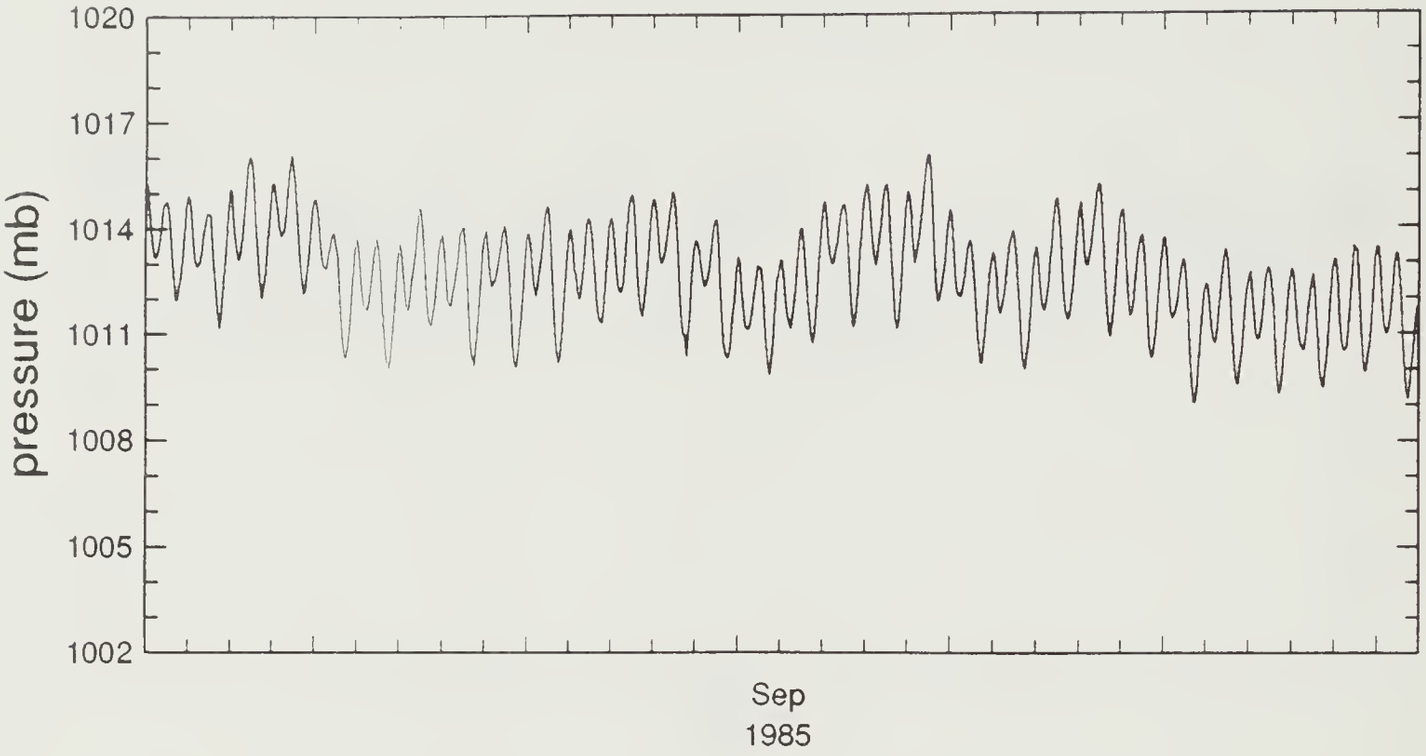
1017
1014
1011
1008
1005
1002
pressure (mb)
Aug
1985

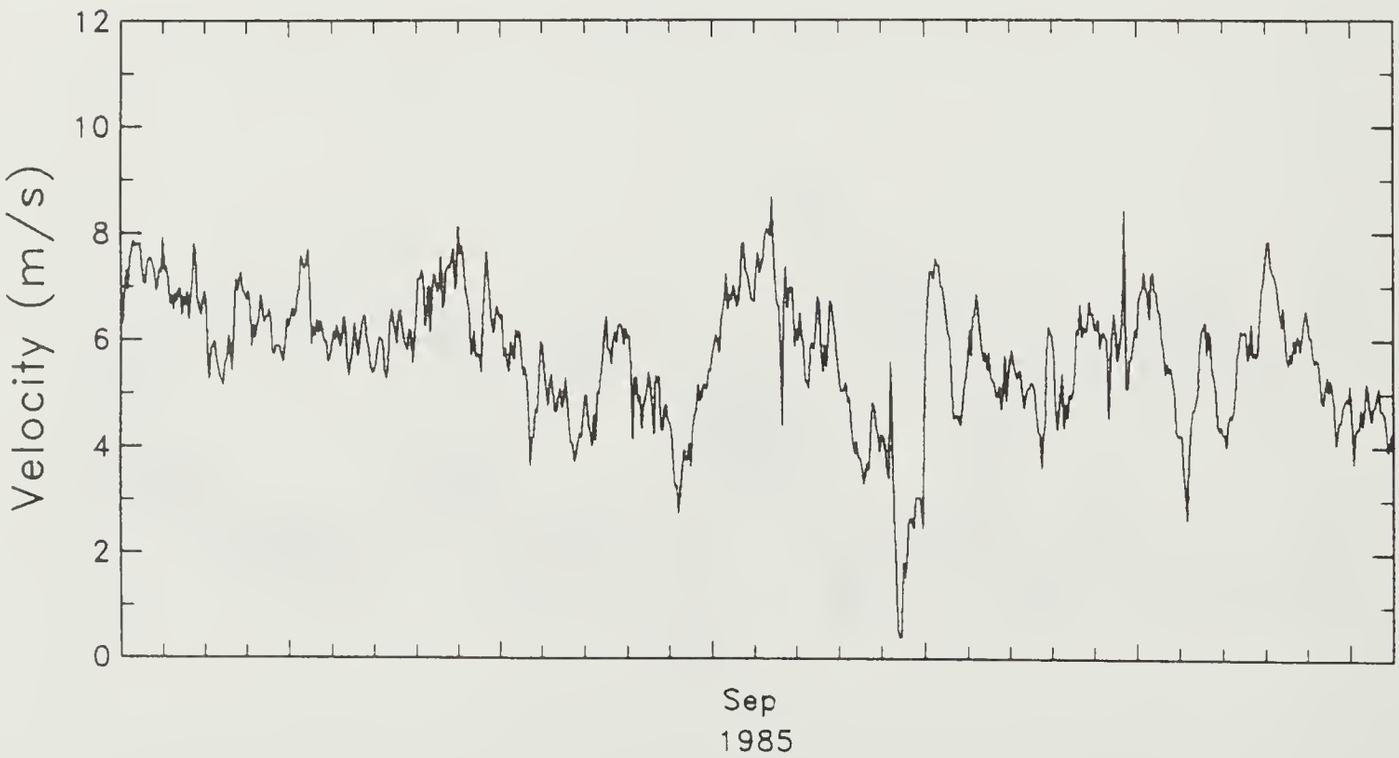

12
10
8
6
4
2
0
Velocity (m/s)
Aug
1985

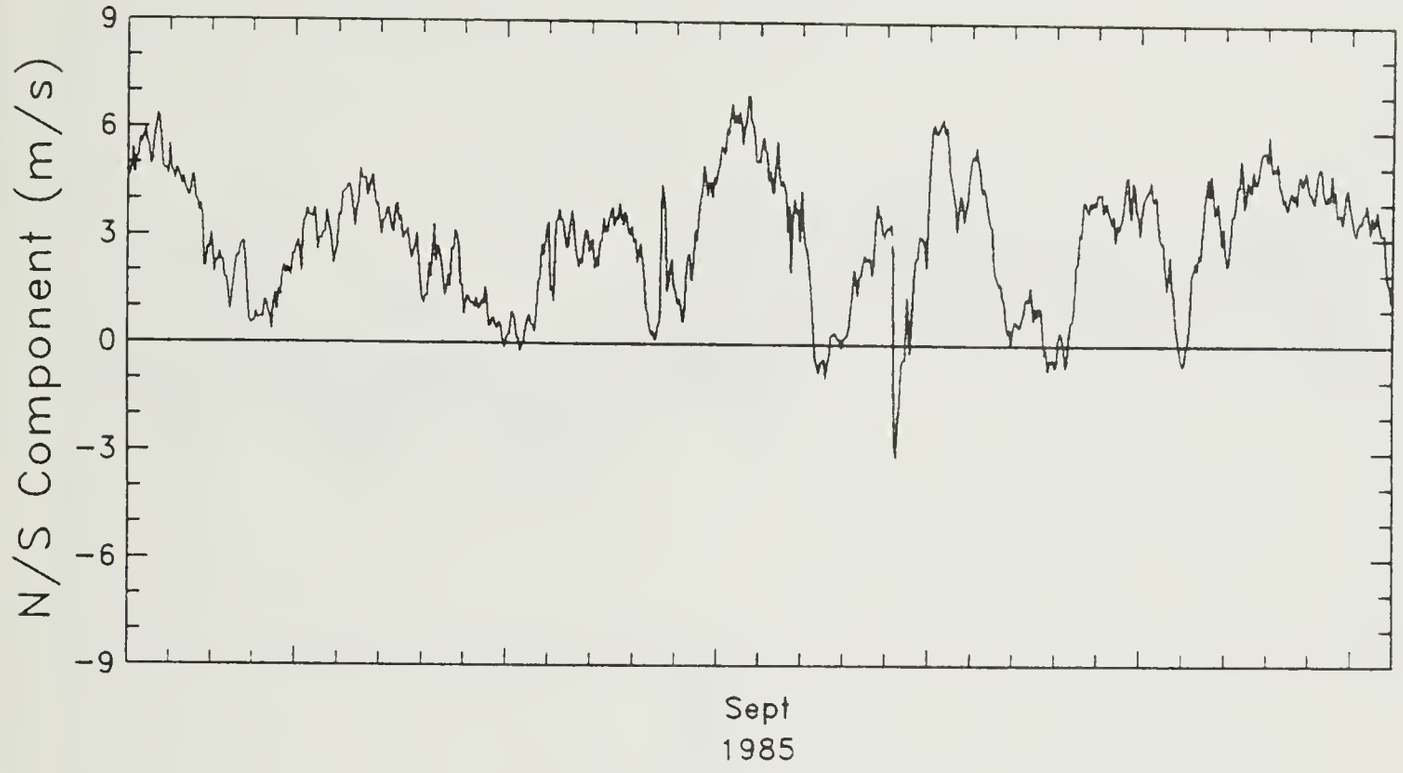

N/S Component (m/s)
9
6
3
0
-3
-6
-9
Aug
1985

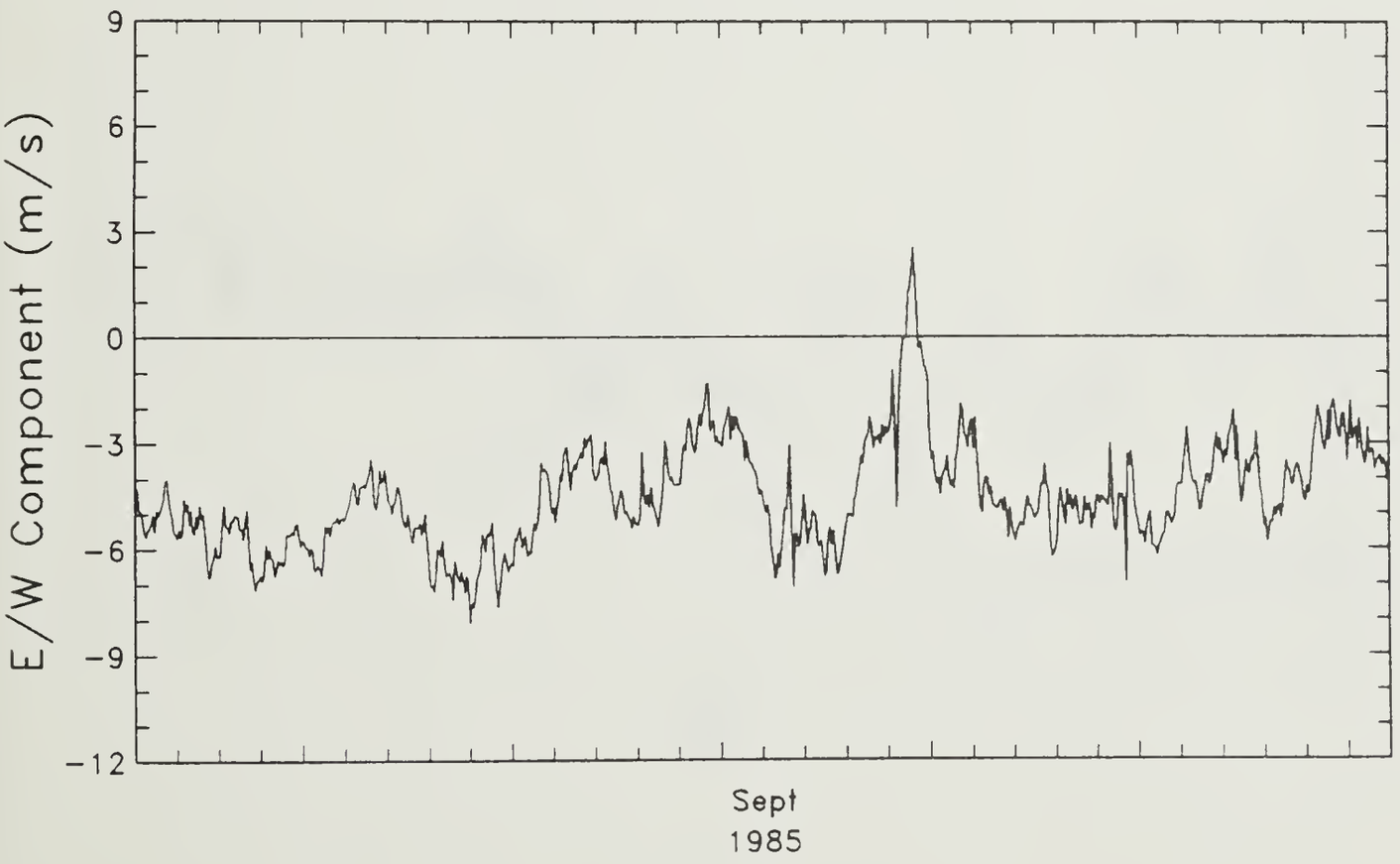

E/W Component (m/s)
9
6
3
0
-3
-6
-9
-12
Aug
1985

September 1985

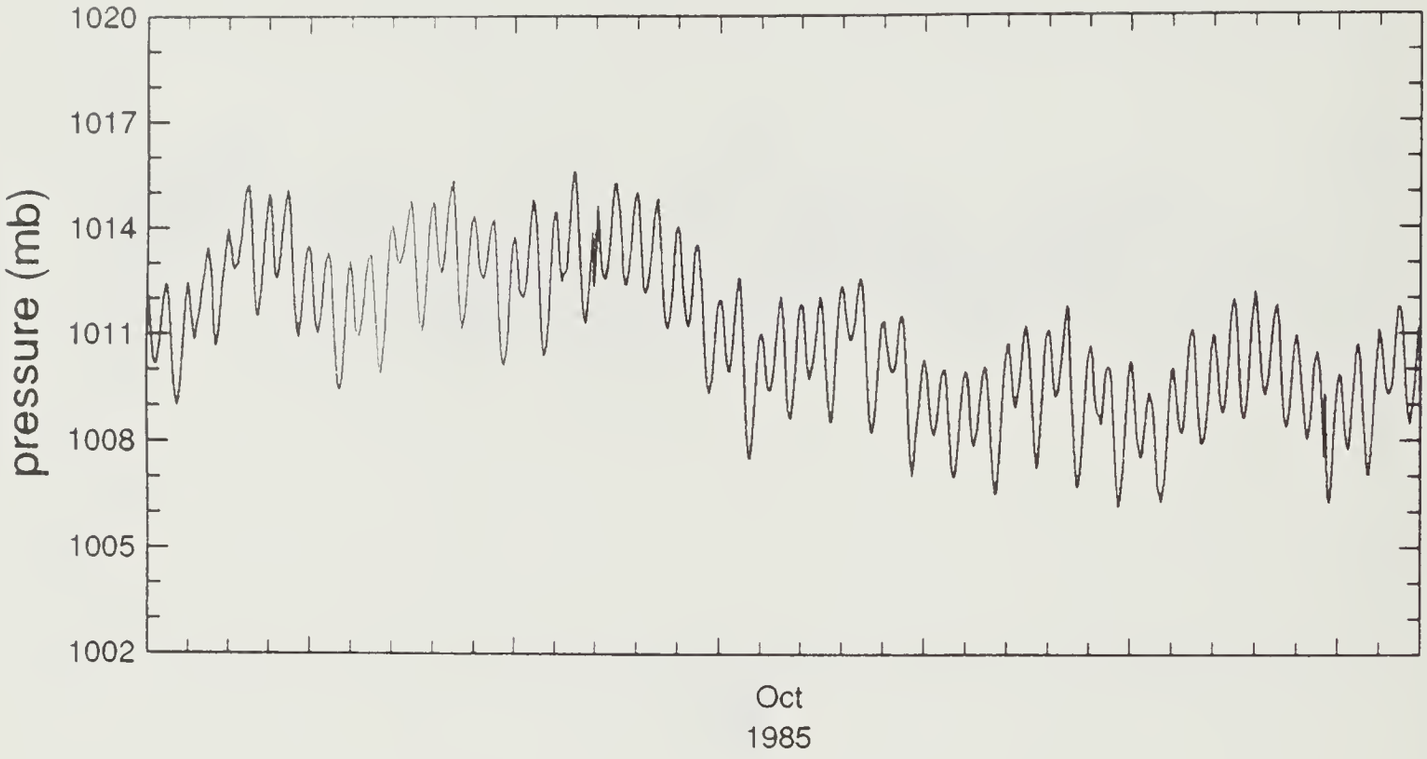


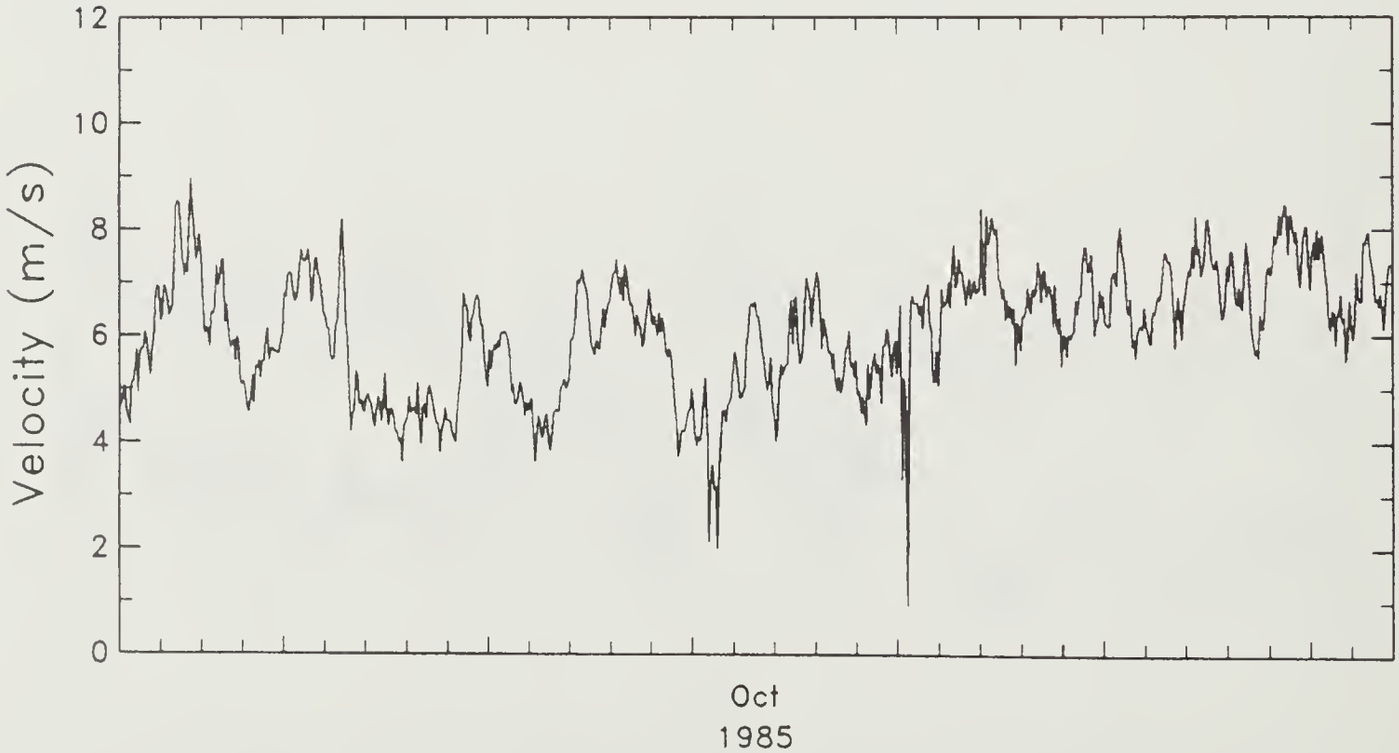


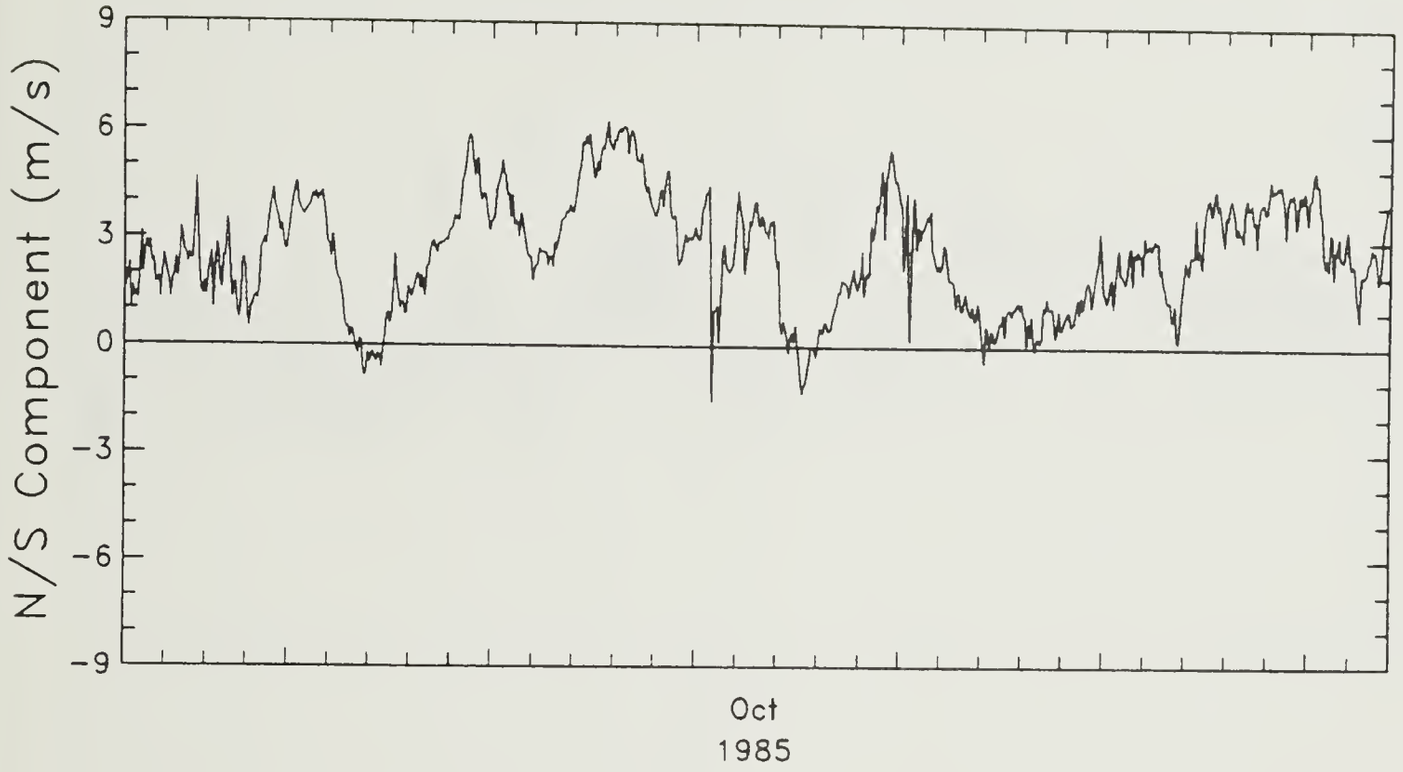

N/S Component (m/s)
9
6
3
0
-3
-6
-9
Sept
1985

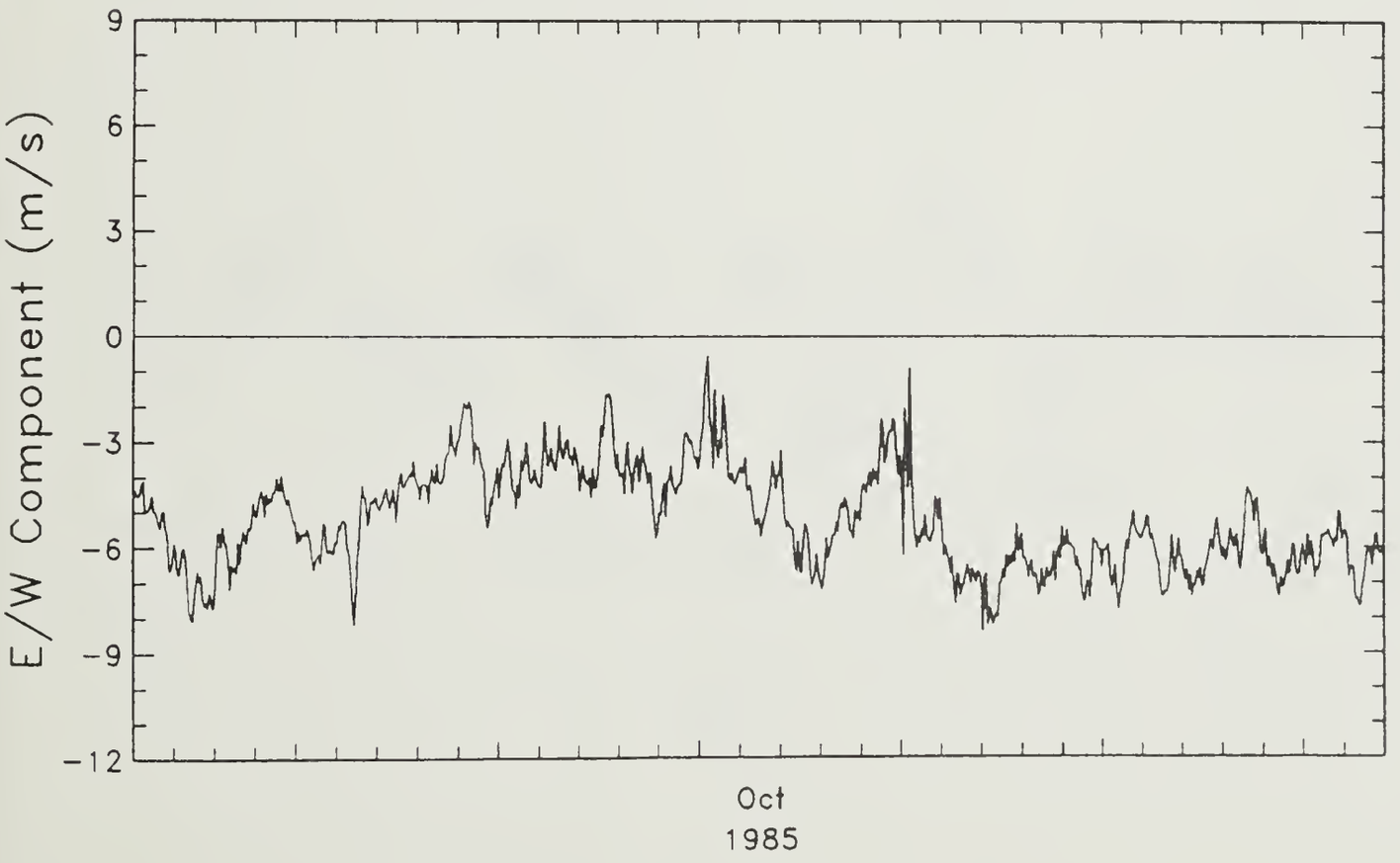

E/W Component (m/s)
9
6
3
0
-3
-6
-9
-12
Sept
1985

October 1985

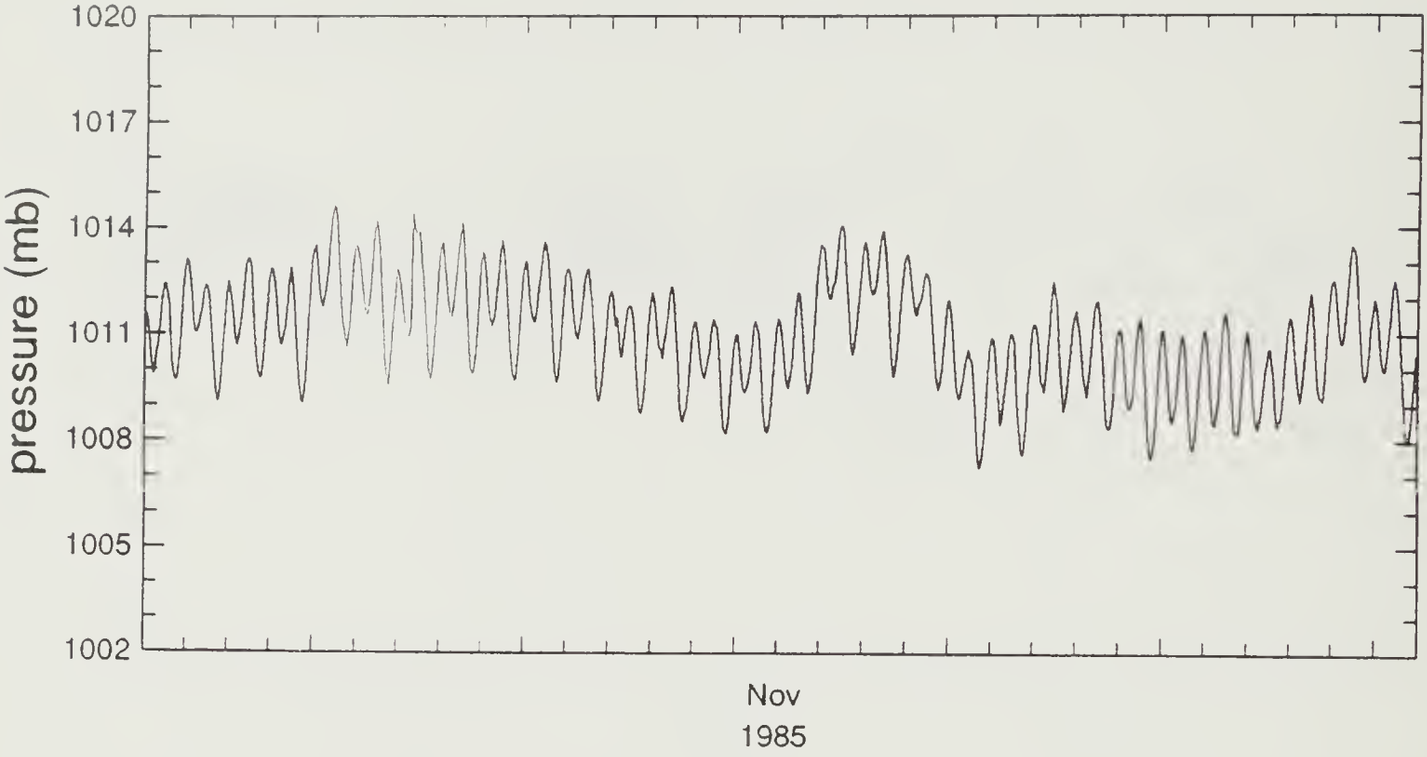


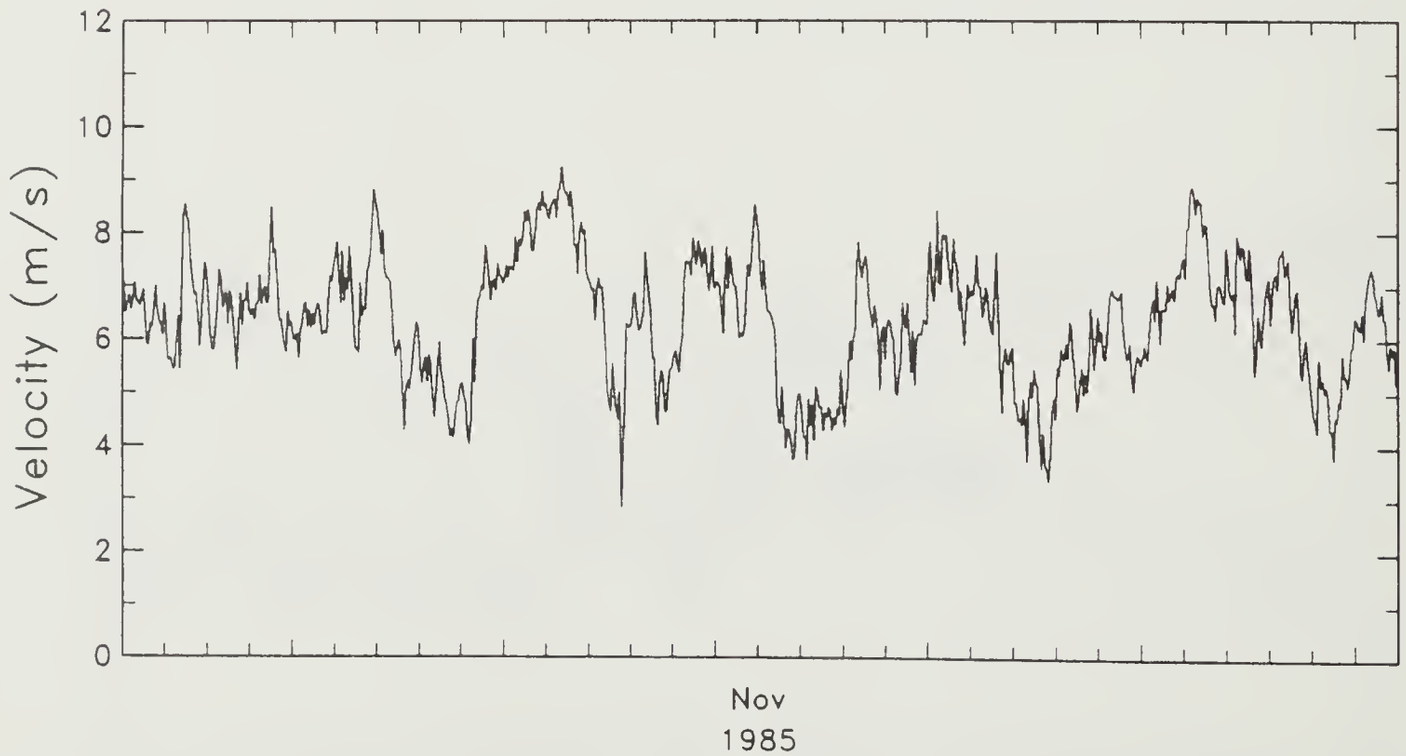


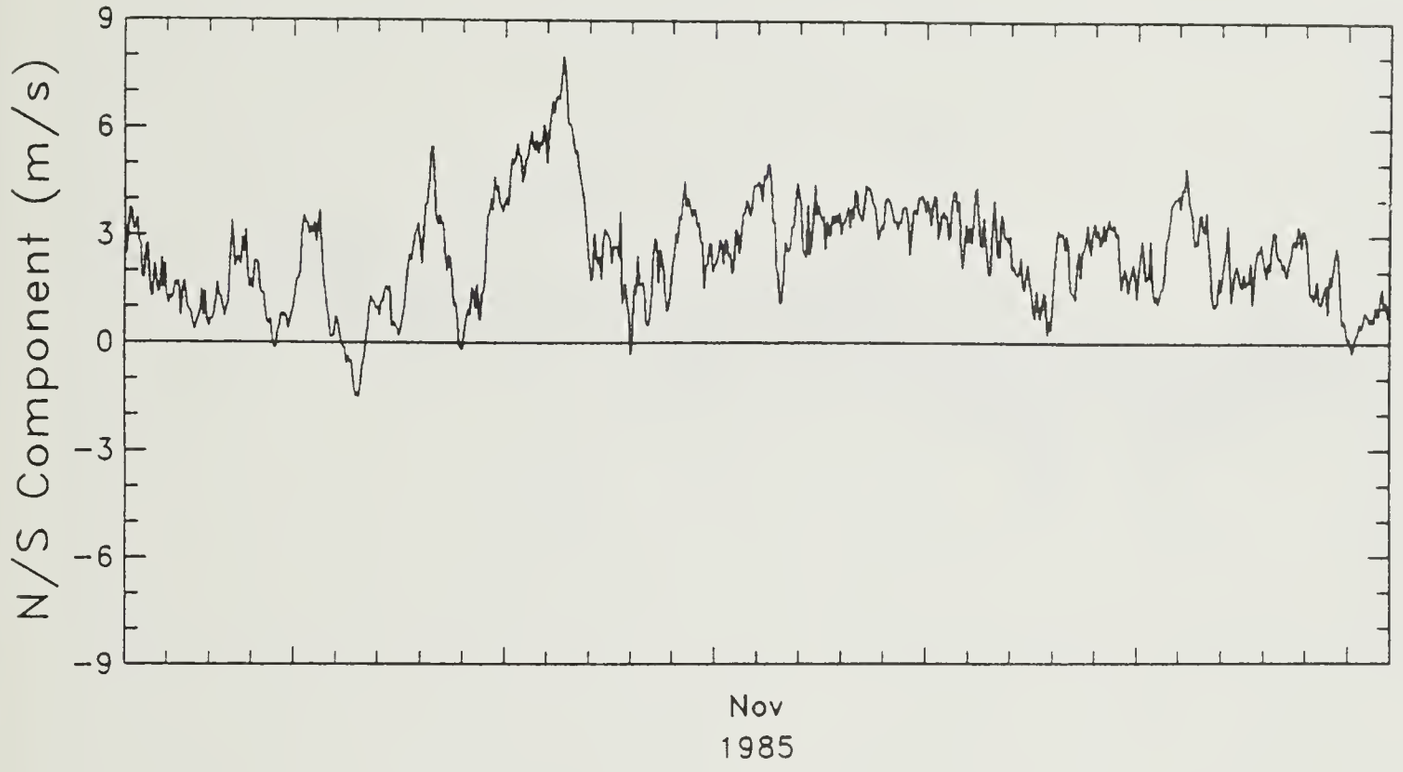

N/S Component (m/s)
9
6
3
0
-3
-6
-9
Oct
1985

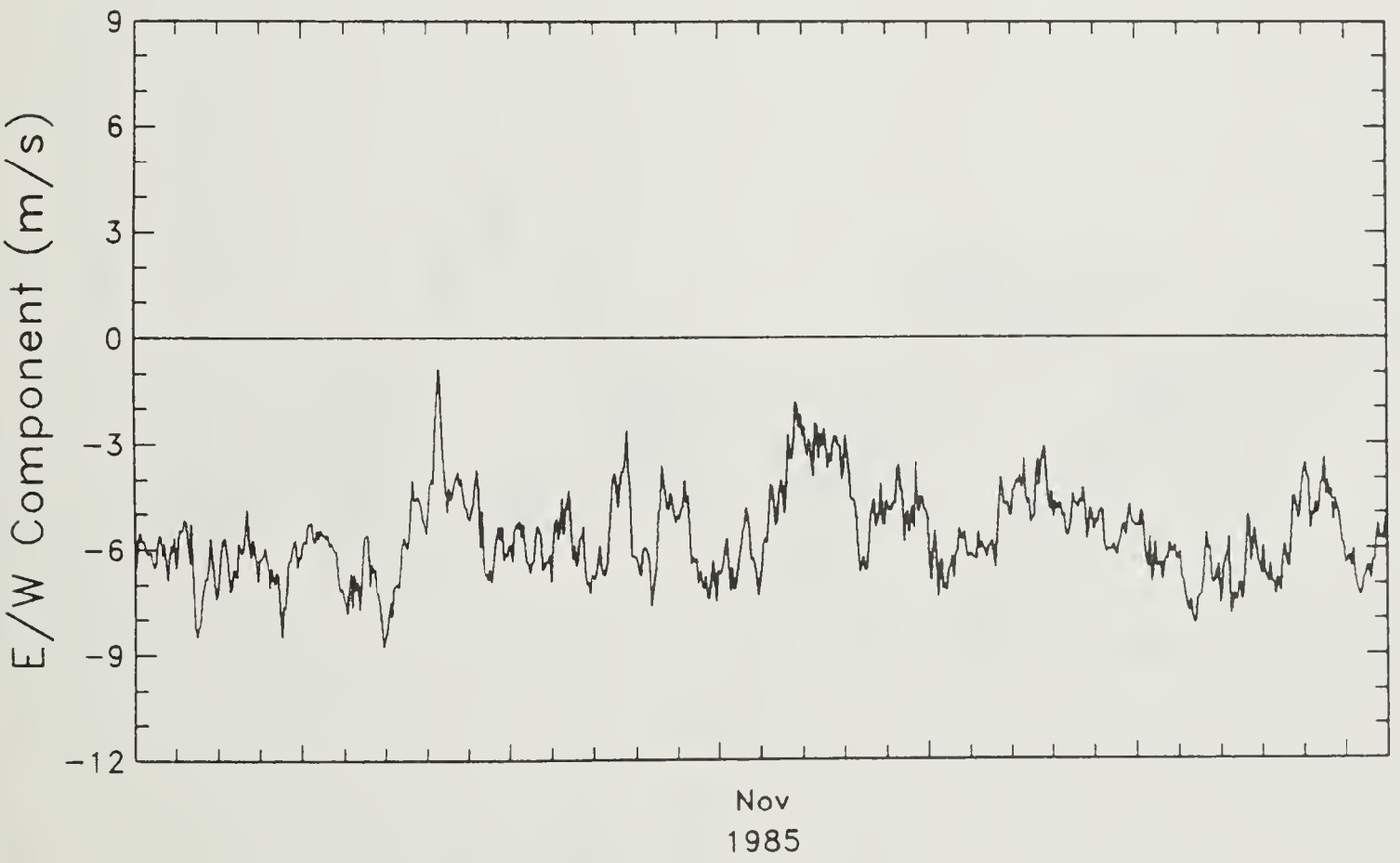

E/W Component (m/s)
9
6
3
0
-3
-6
-9
-12
Oct
1985

November 1985

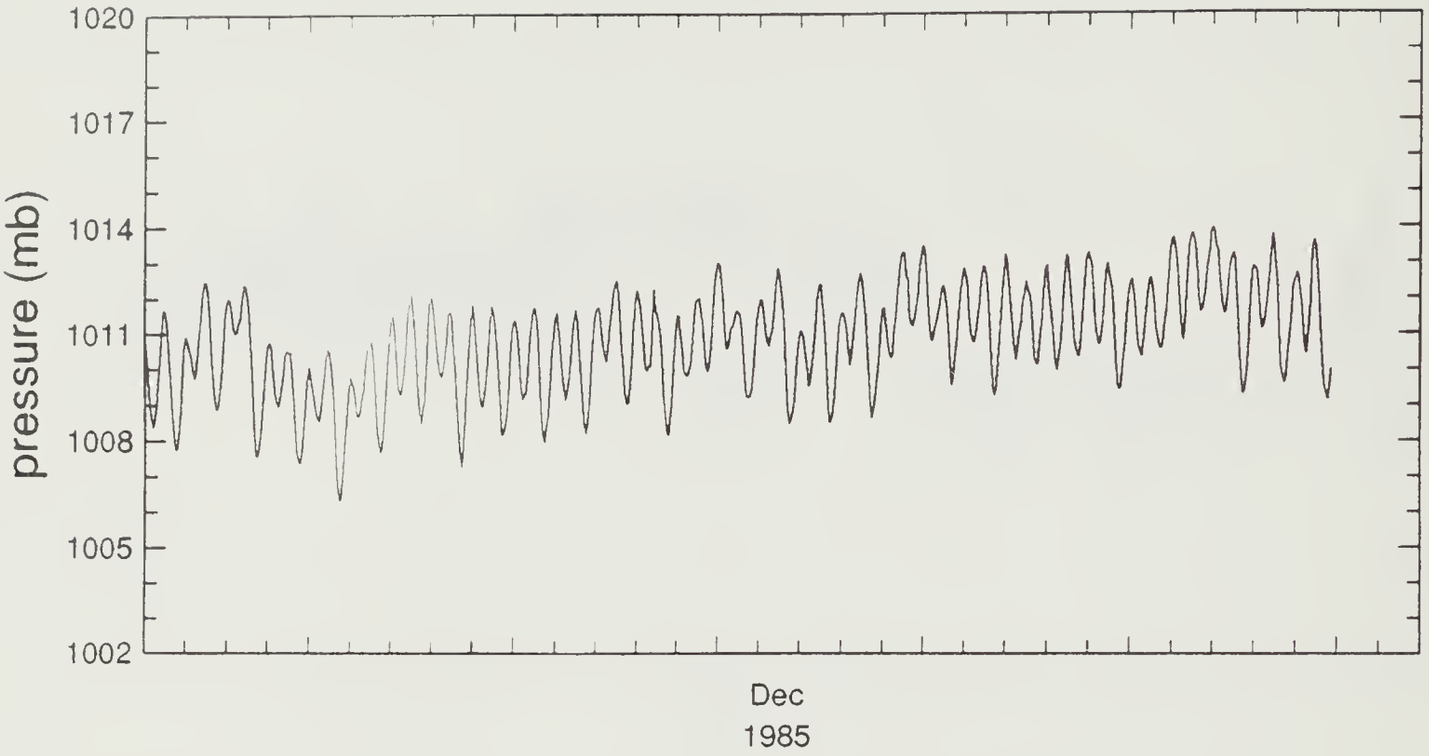


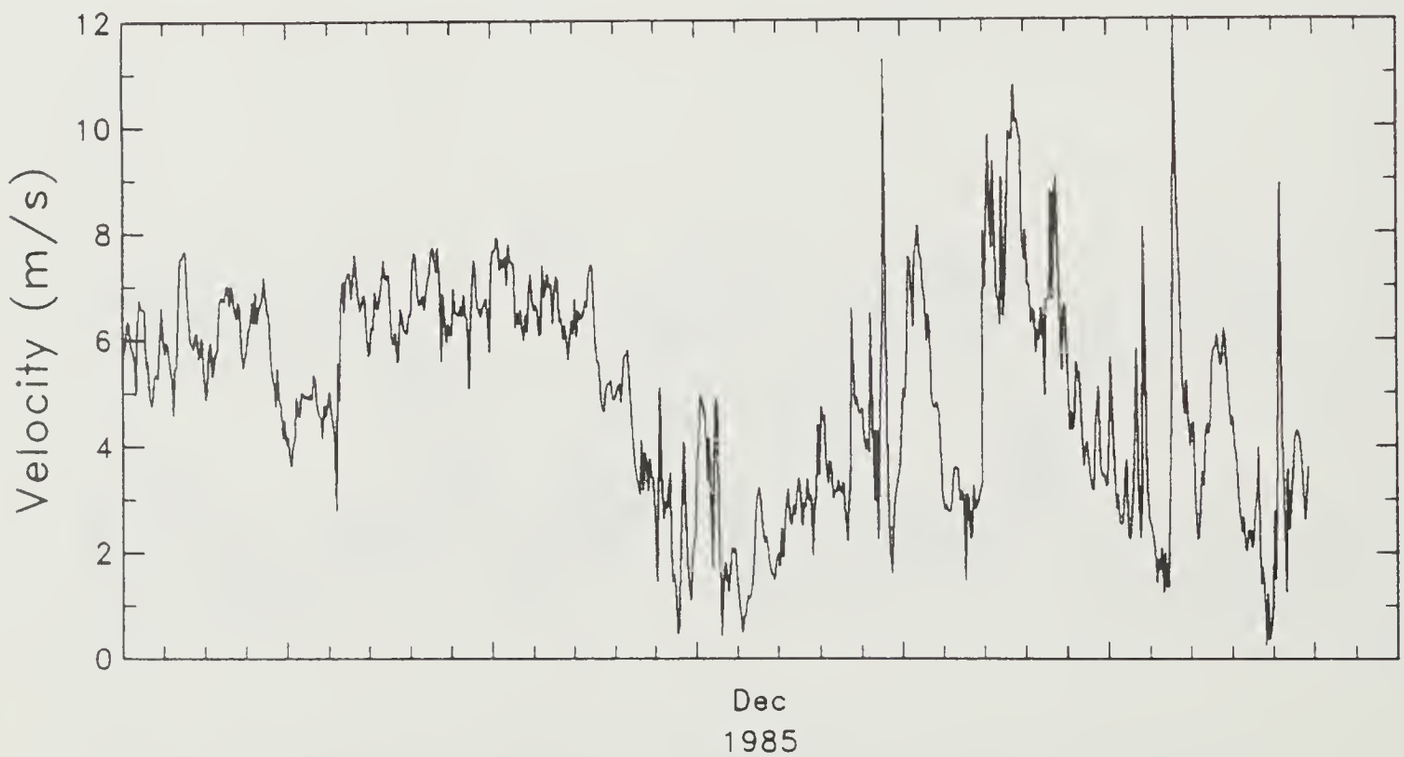


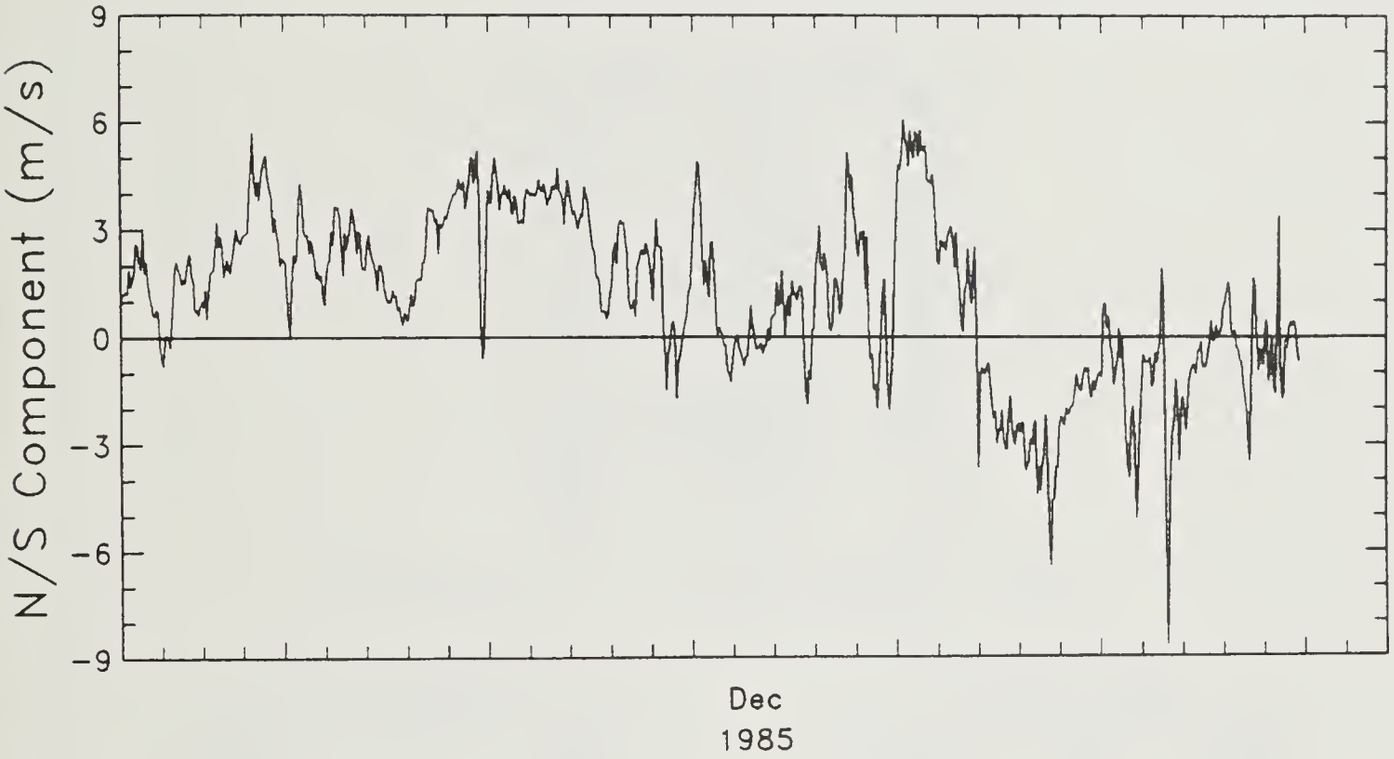

N/S Component (m/s)
9
6
3
0
-3
-6
-9
Nov
1985

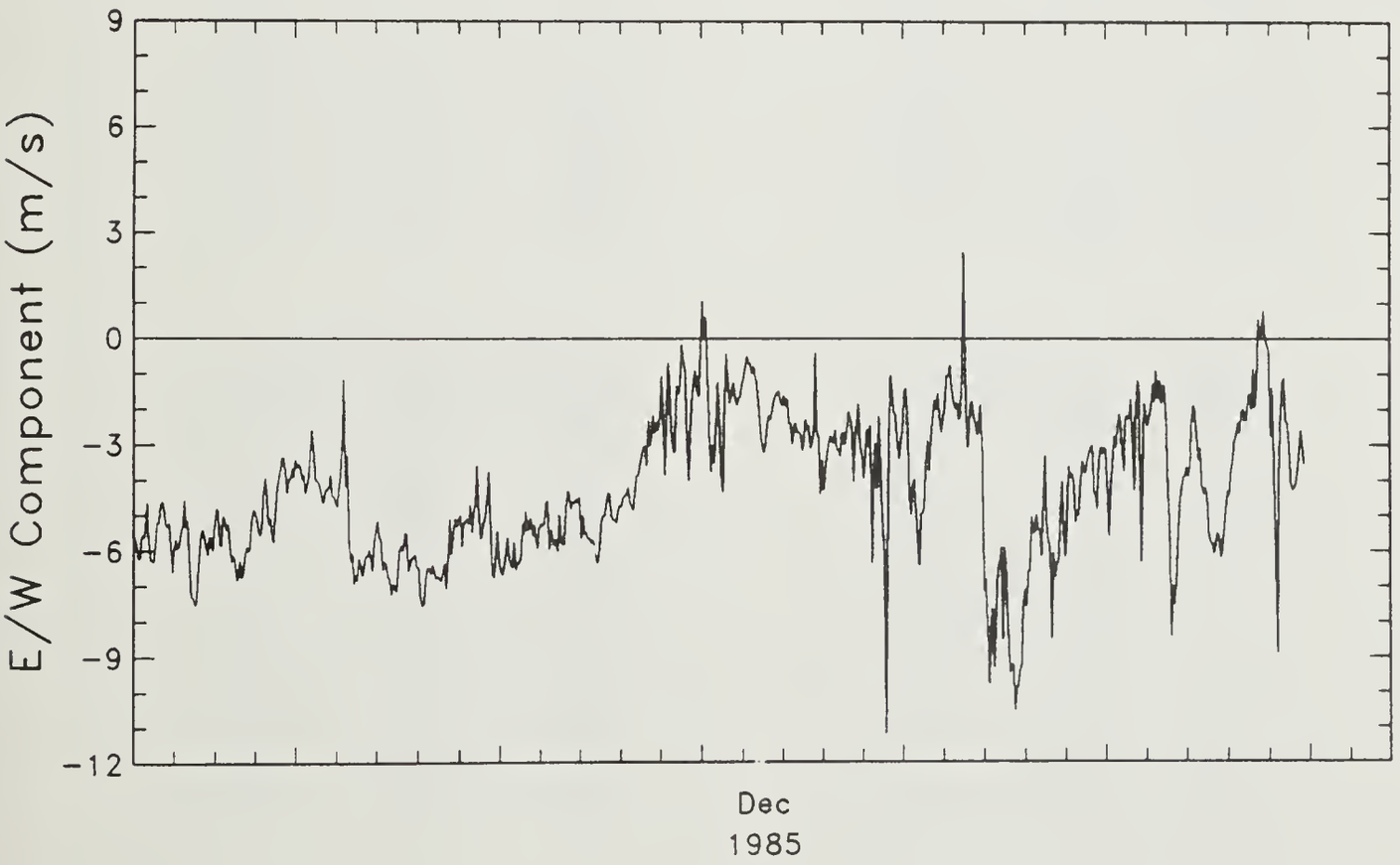

E/W Component (m/s)
9
6
3
0
-3
-6
-9
-12
Nov
1985

December 1985






N/S Component (m/s)
9
6
3
0
-3
-6
-9
Dec
1985


E/W Component (m/s)
9
6
3
0
-3
-6
-9
-12
Dec
1985

1985 Pressure (mb)		
Month	**Mean**	**Std Dev**
Jan	1010.03	1.37
Feb	1010.56	1.60
Mar	1009.54	1.90
Apr	1009.77	1.70
May	1010.97	1.44
Jun	1013.30	1.80
Jul	1013.55	1.33
Aug	1013.61	1.27
Sep	1012.63	1.42
Oct	1010.96	2.08
Nov	1010.98	1.49
Dec	1010.79	1.43

1985 Velocity		
Month	**Mean**	**Std Dev**
Jan	4.07	1.59
Feb	3.35	1.45
Mar	3.39	1.33
Apr	2.93	1.57
May	3.63	1.75
Jun	5.04	1.47
Jul	5.10	1.43
Aug	6.27	1.12
Sep	5.71	1.21
Oct	6.09	1.15
Nov	6.37	1.15
Dec	4.95	2.04

1985 Direction		
Month	**Mean**	**Std Dev**
Jan	-125.91	41.19
Feb	-123.55	79.71
Mar	-115.63	87.10
Apr	-70.28	132.65
May	-105.68	61.19
Jun	-80.10	20.58
Jul	-65.52	28.44
Aug	-65.15	18.04
Sep	-57.01	24.02
Oct	-62.99	17.45
Nov	-66.00	14.12
Dec	-75.50	32.54

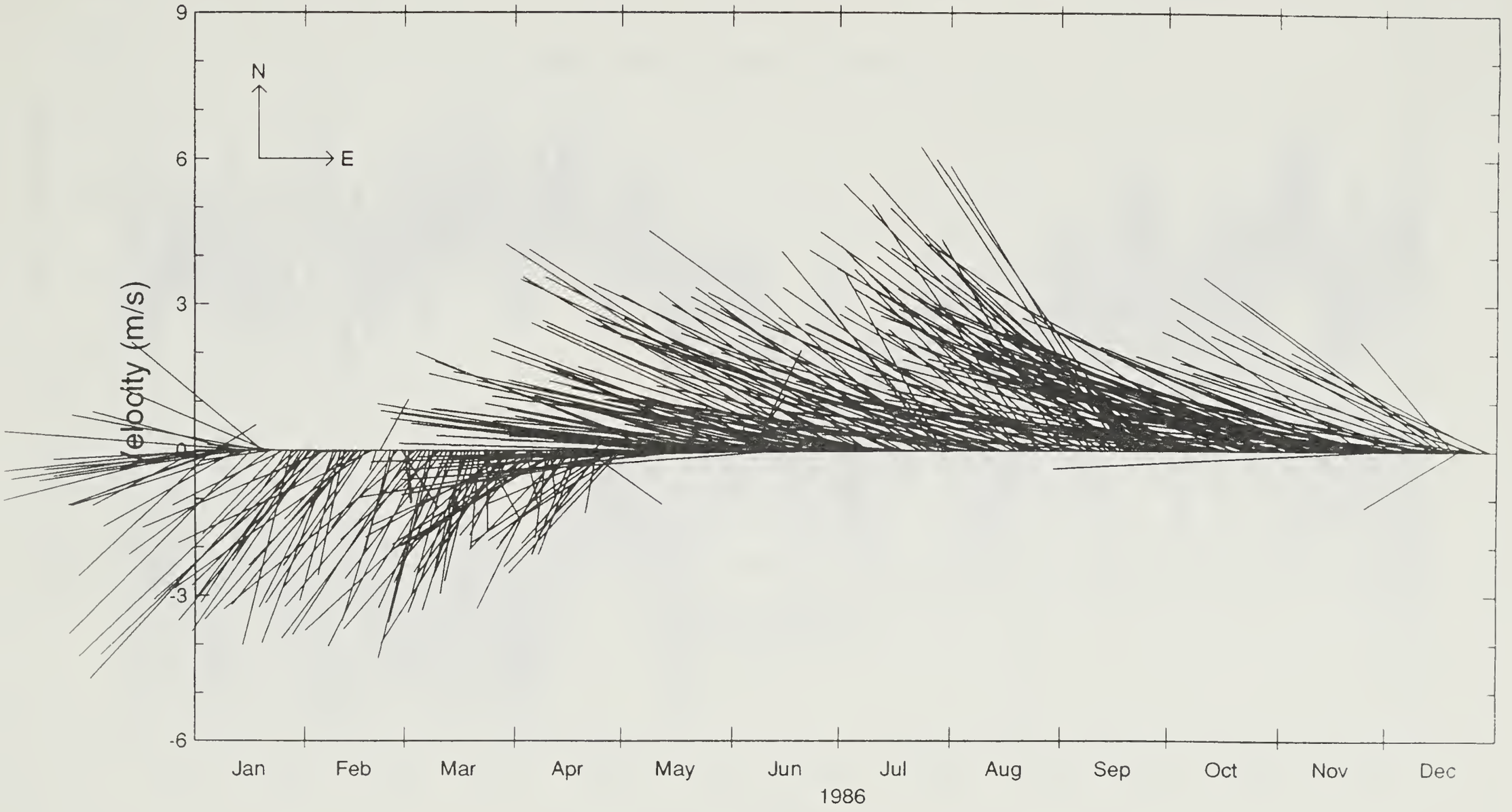
1985 N-S Component		
Month	**Mean**	**Std Dev**
Jan	-2.48	1.45
Feb	-2.48	1.29
Mar	-2.37	1.45
Apr	-2.20	1.51
May	-1.04	1.67
Jun	0.64	1.31
Jul	1.62	1.60
Aug	2.46	1.48
Sep	2.92	1.76
Oct	2.60	1.54
Nov	2.50	1.48
Dec	1.16	2.31

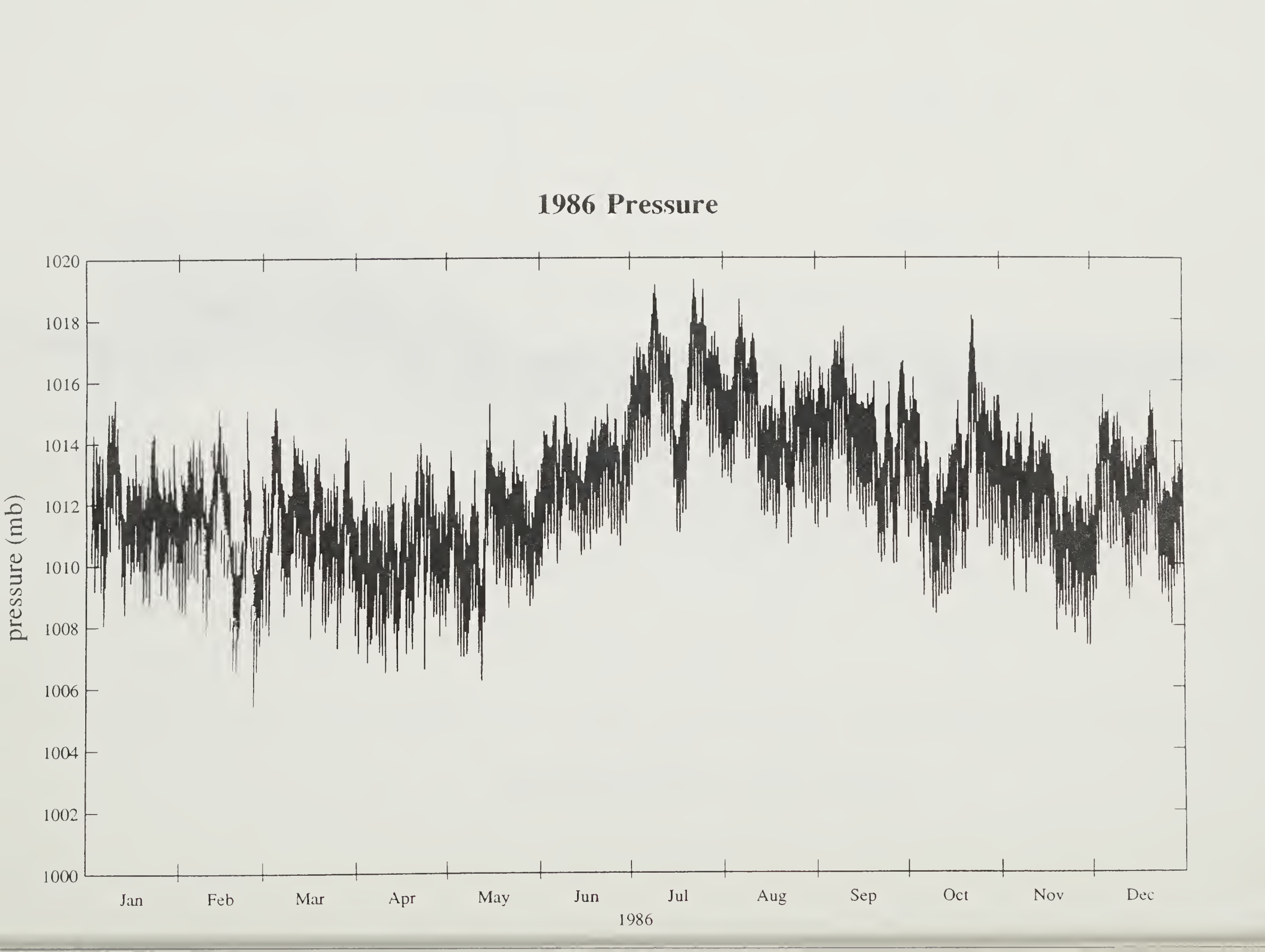
1985 E-W Component		
Month	**Mean**	**Std Dev**
Jan	-2.93	1.49
Feb	-1.75	1.58
Mar	-1.80	1.52
Apr	-1.14	1.62
May	-2.89	2.01
Jun	-4.74	1.73
Jul	-4.31	2.08
Aug	-5.48	1.50
Sep	-4.50	1.48
Oct	-5.21	1.44
Nov	-5.65	1.23
Dec	-4.24	2.01

1986

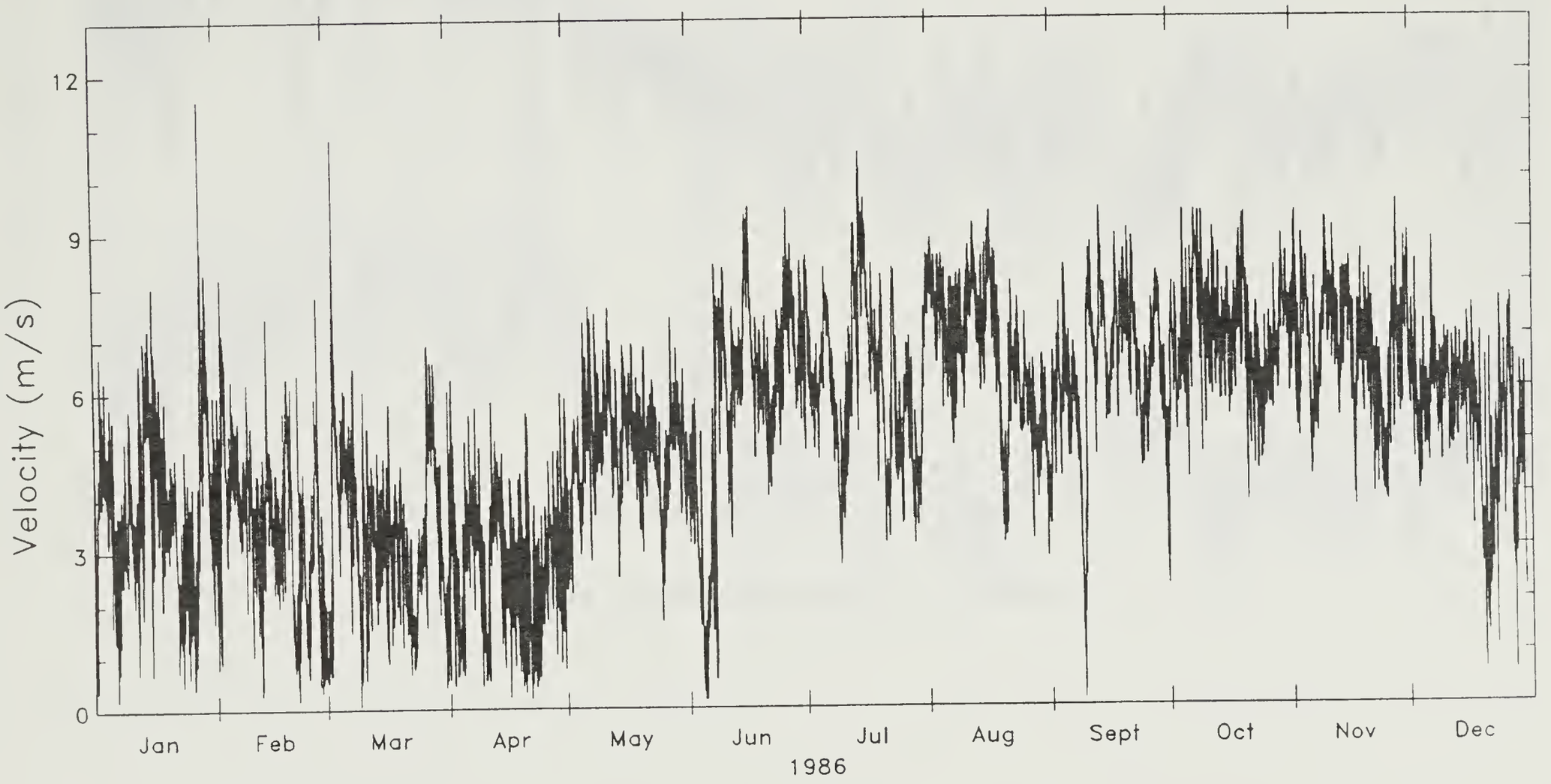
January 2 - December 31

1986 Wind Speed (daily values)

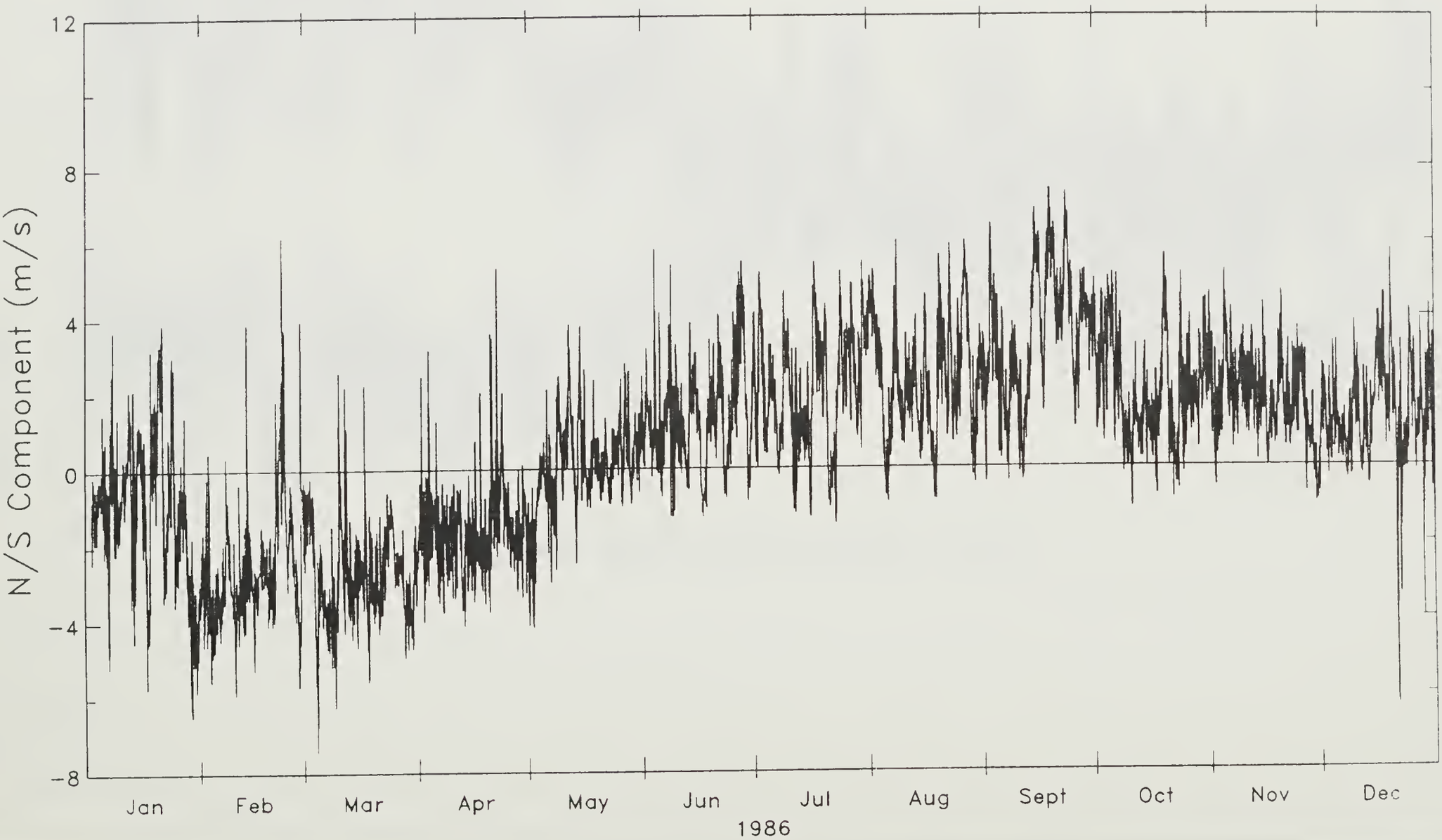



1986 Pressure
pressure (mb)
1020
1018
1016
1014
1012
1010
1008
1006
1004
1002
1000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
1986

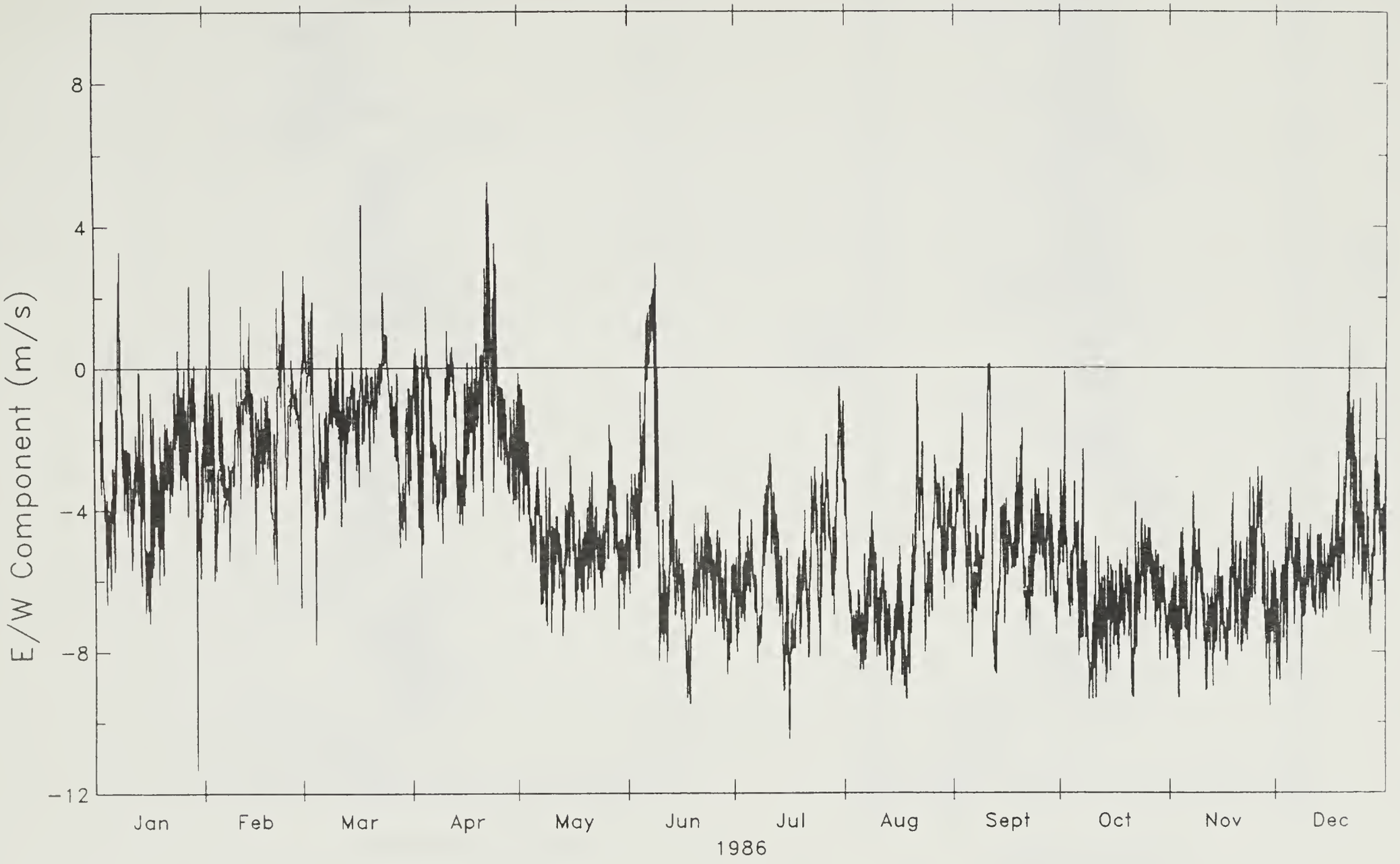
1986 Wind Speed (hourly values)



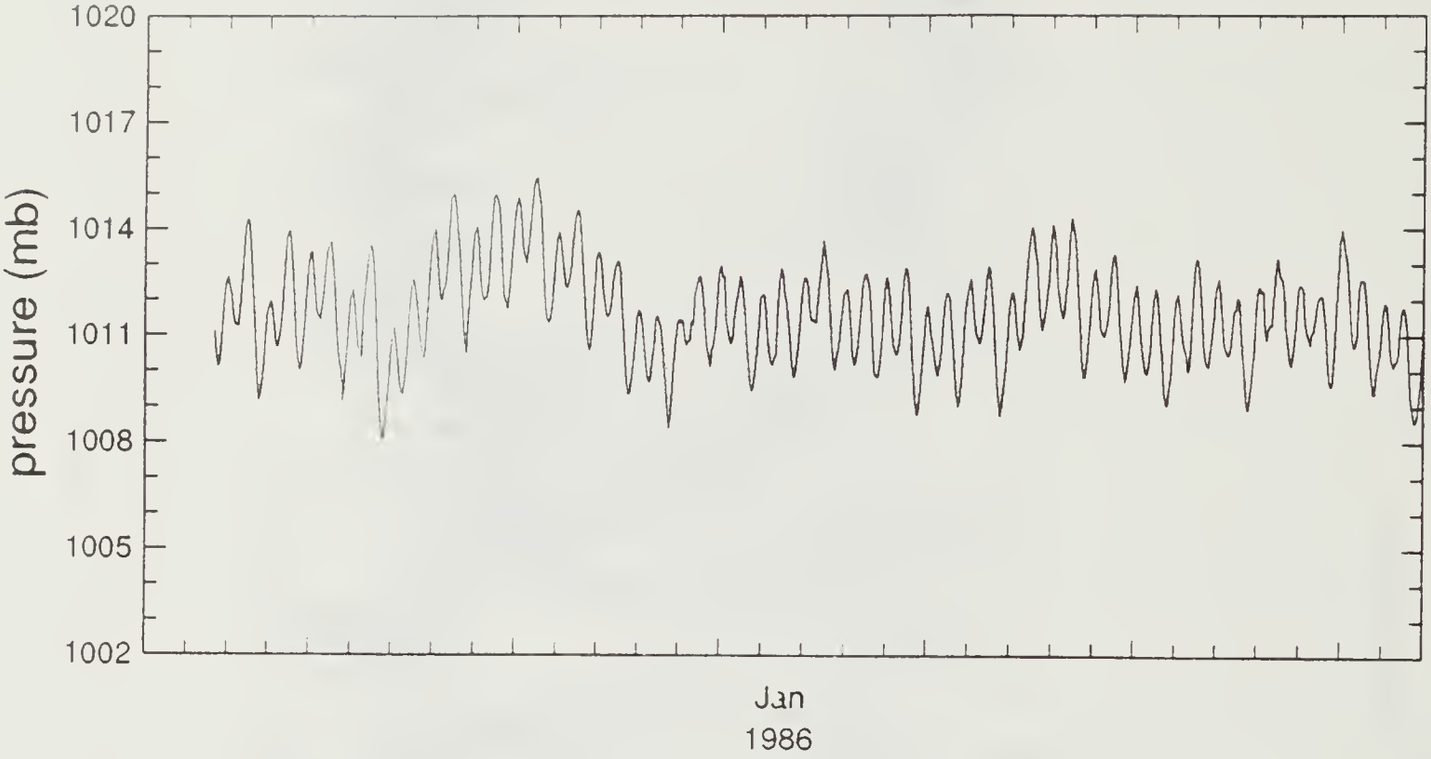
1986 Wind Meridional Component

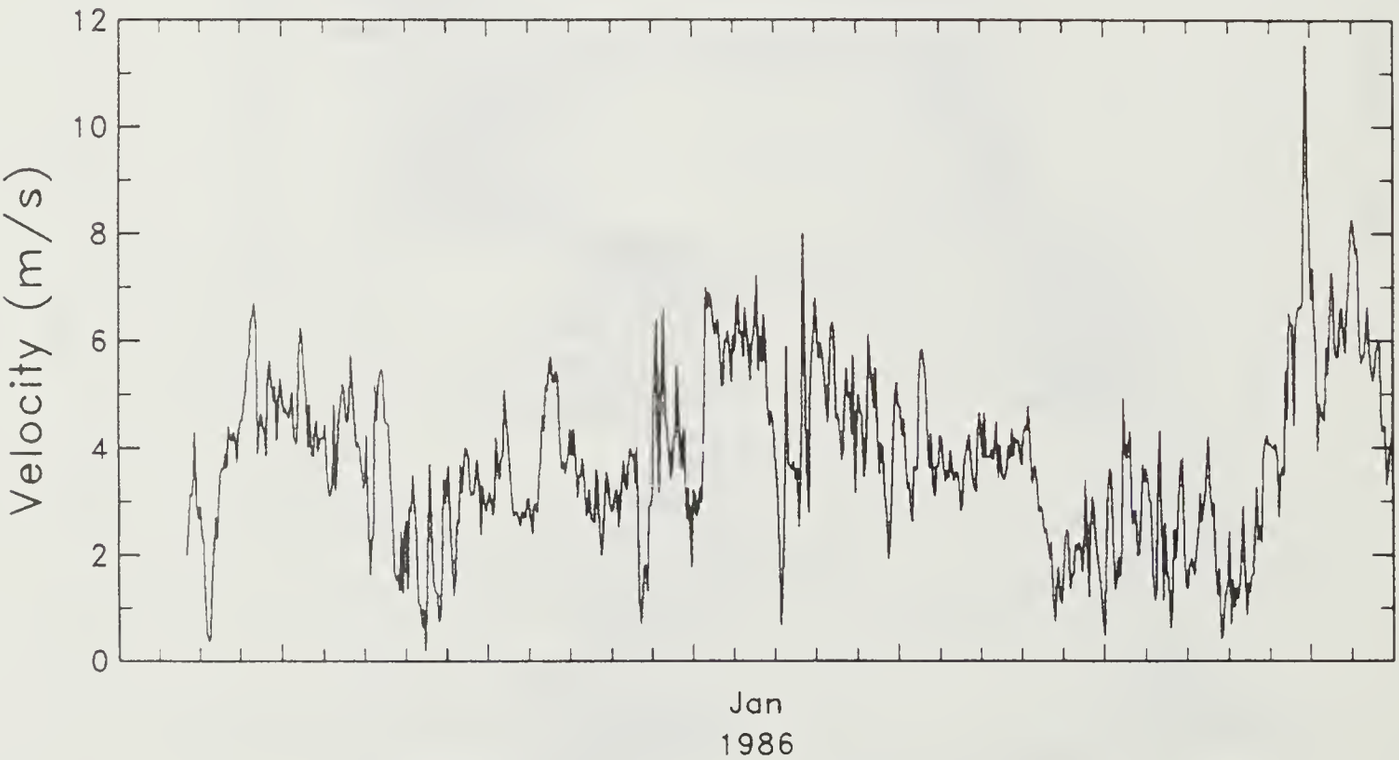


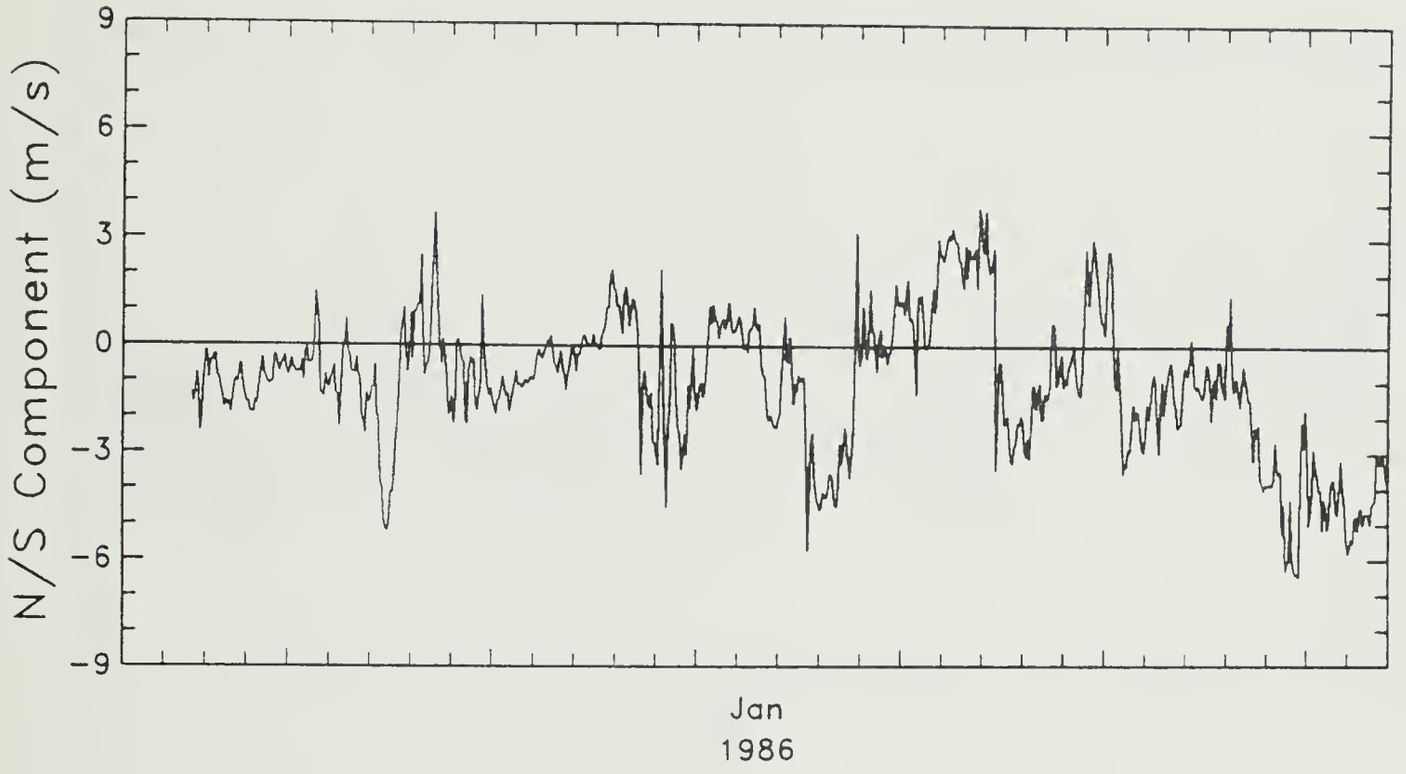
1986 Wind Zonal Component

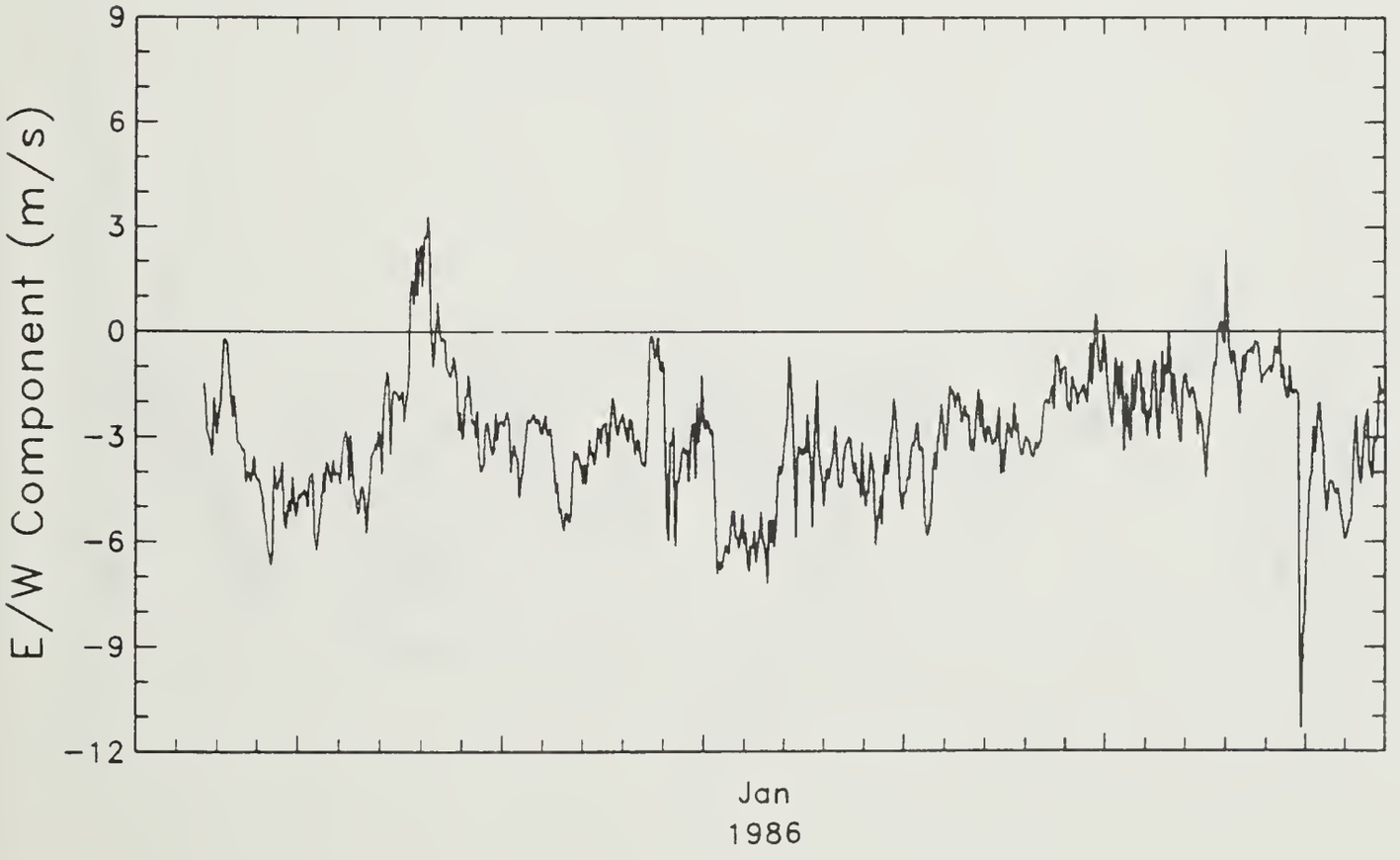


January 1986

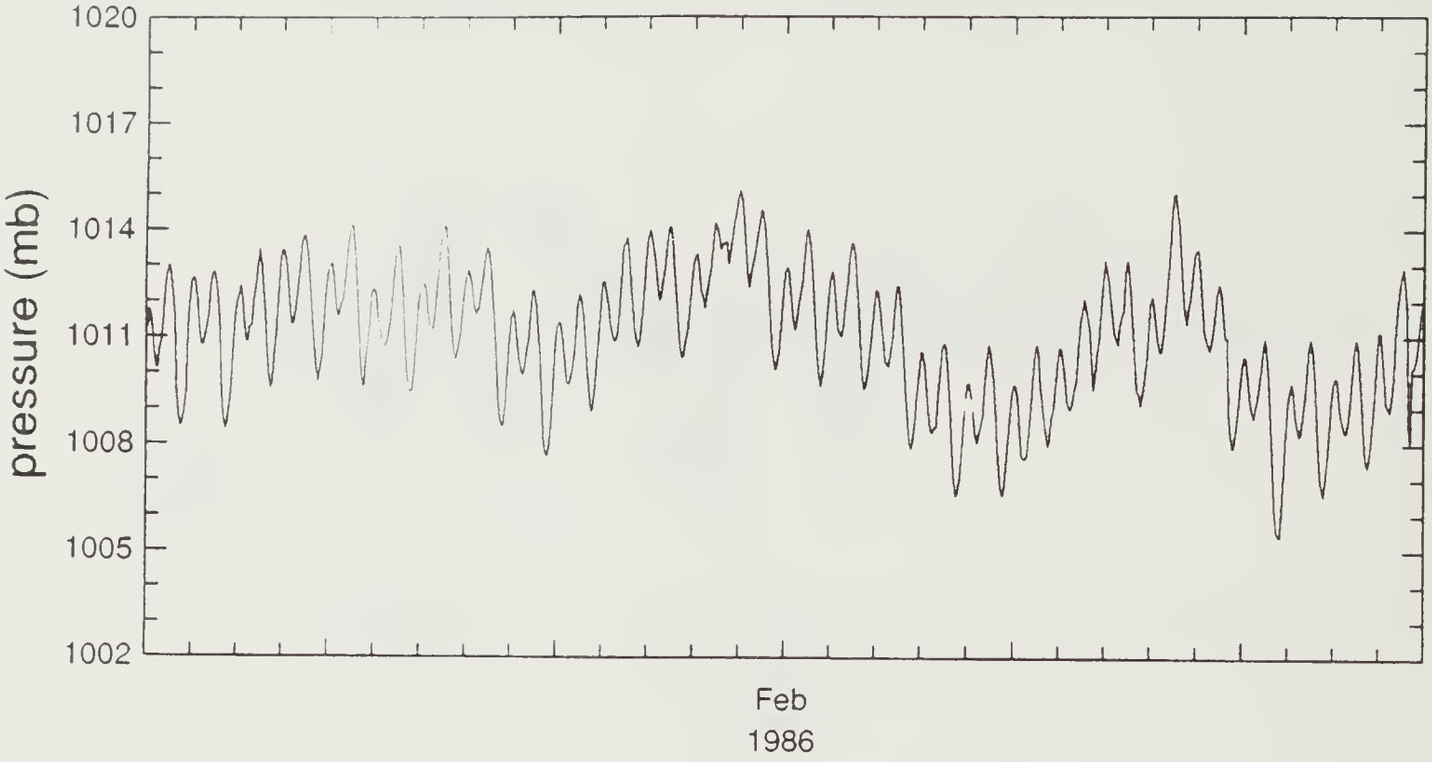


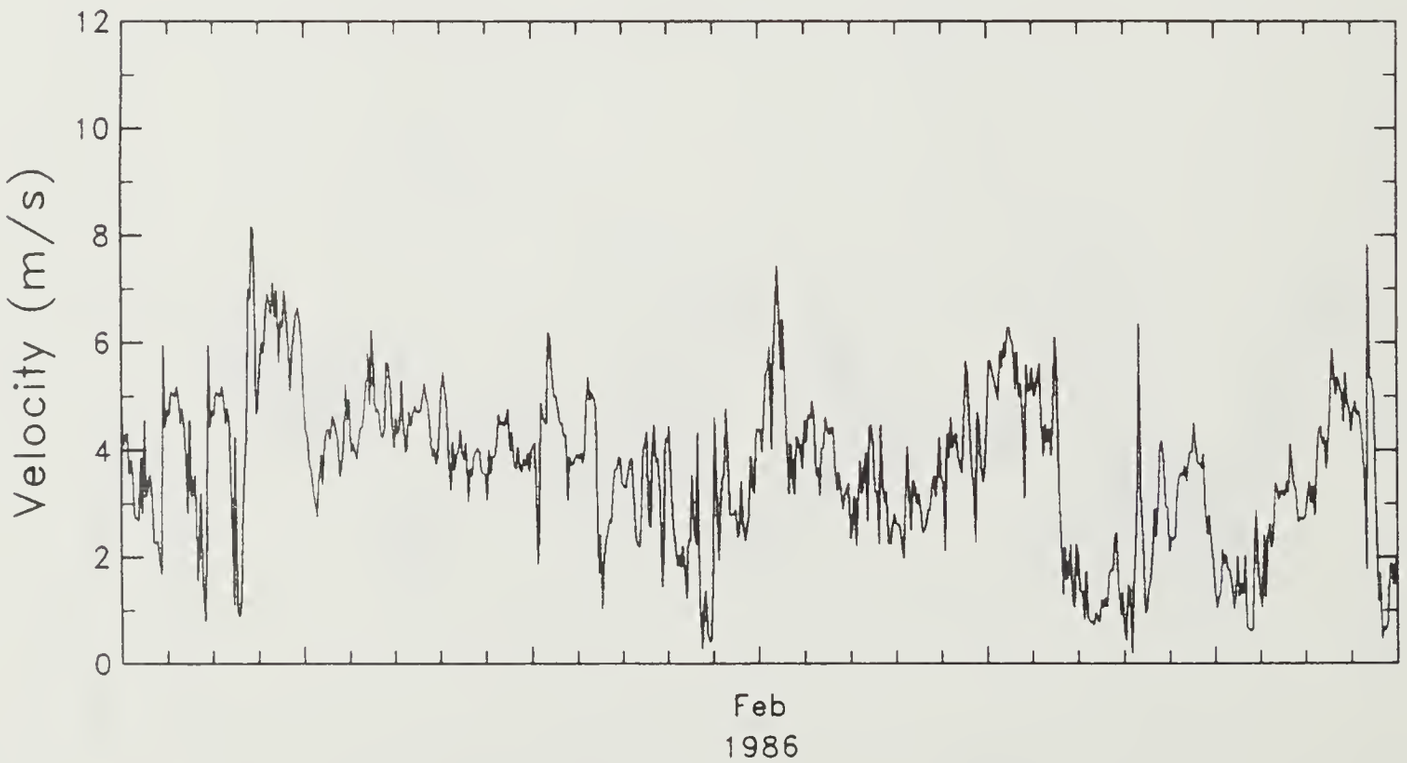


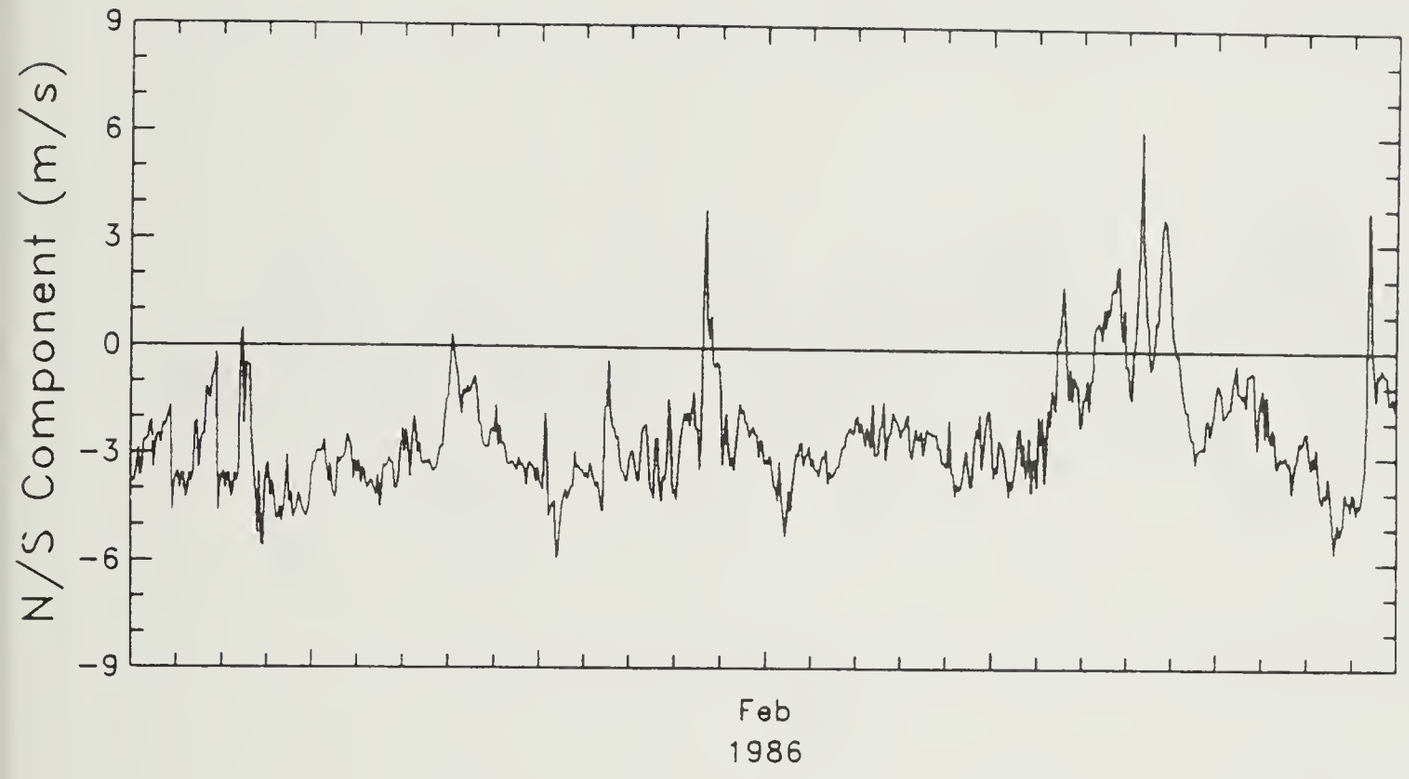

N/S Component (m/s)
9
6
3
0
-3
-6
-9
Jan
1986

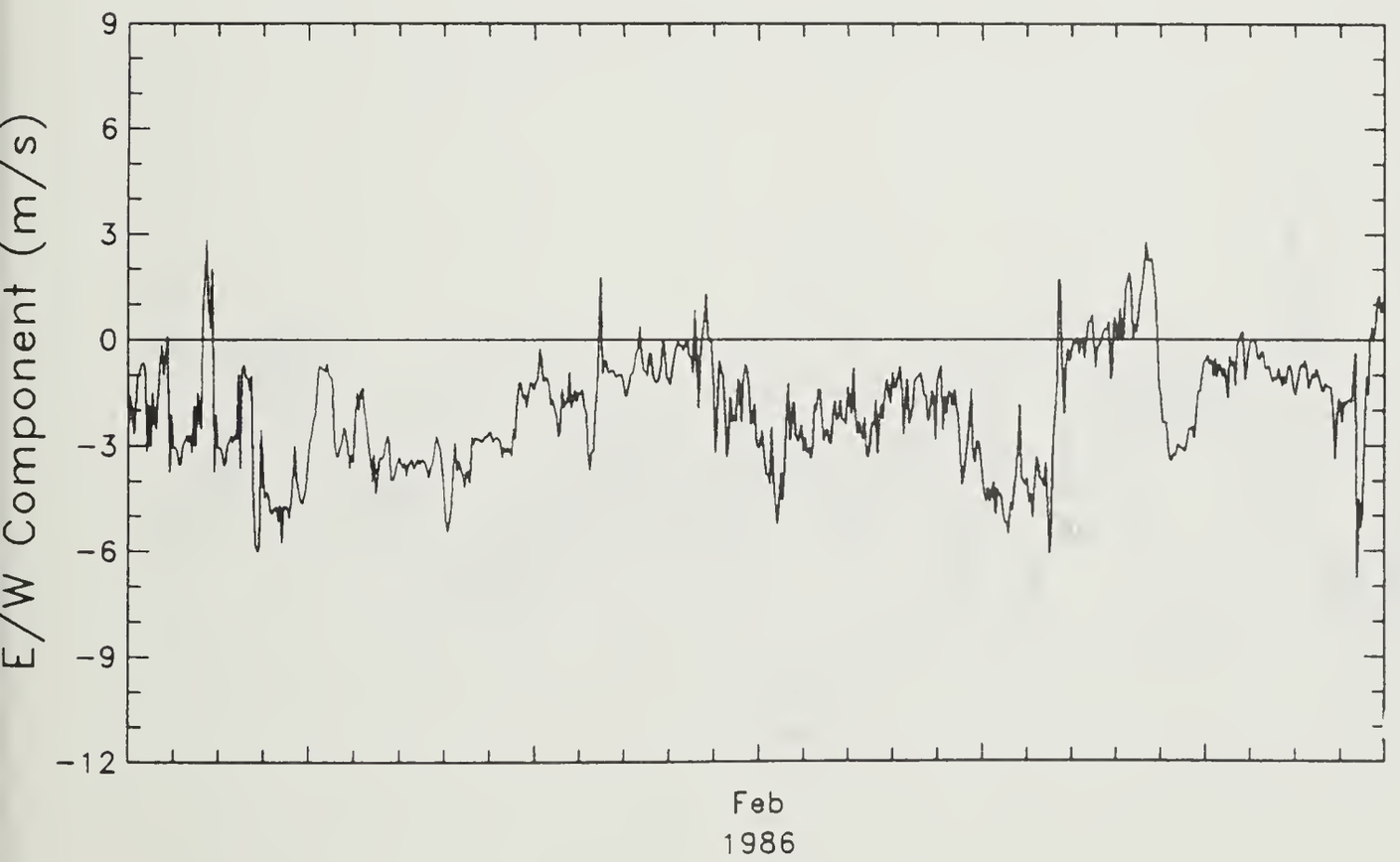

E/W Component (m/s)
9
6
3
0
-3
-6
-9
-12
Jan
1986

February 1986

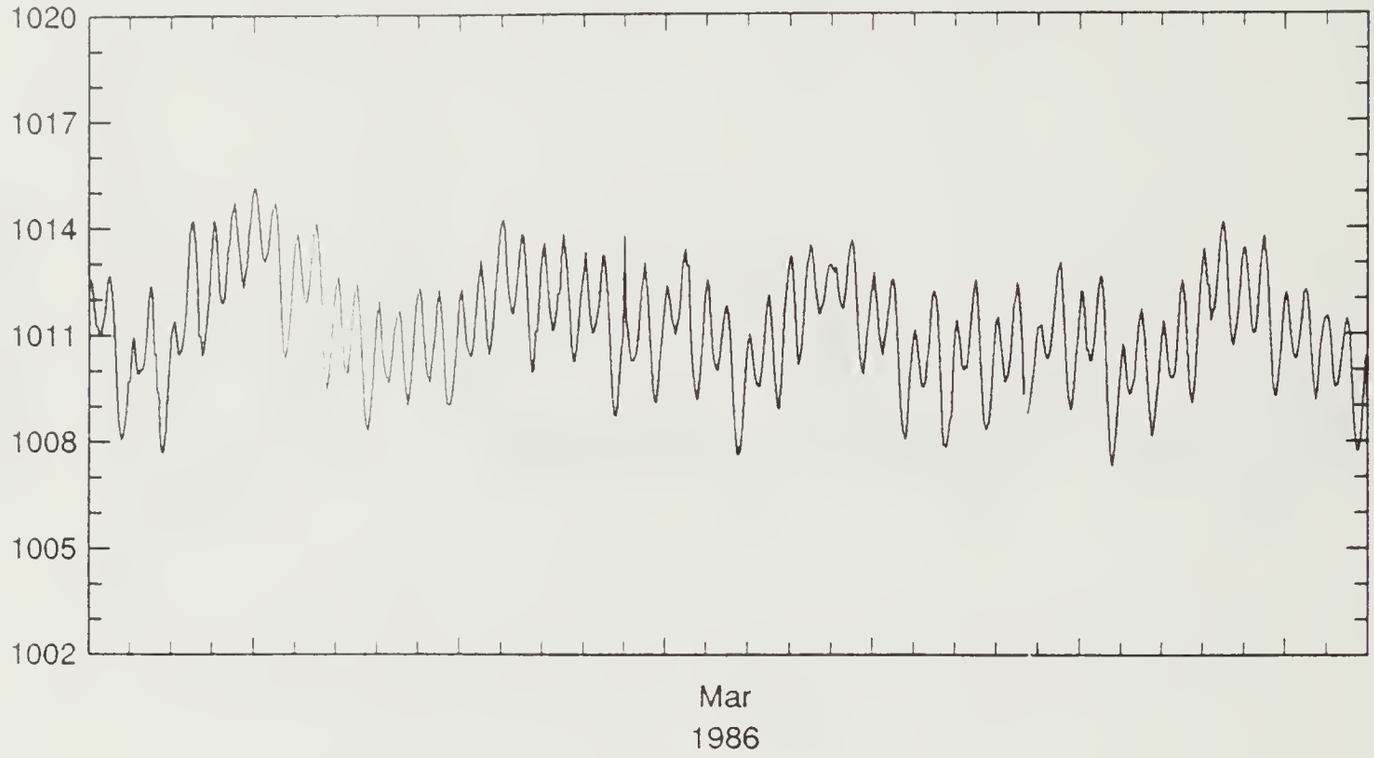


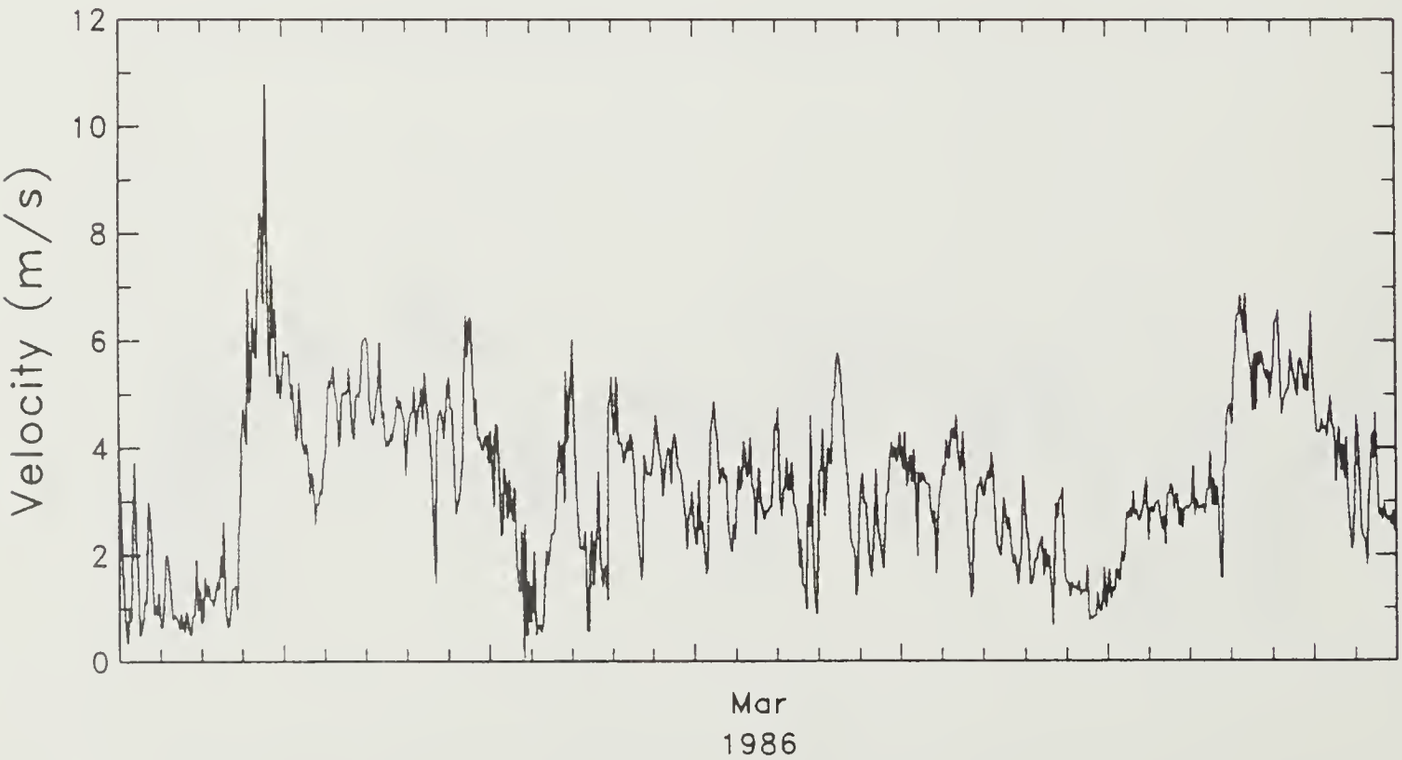


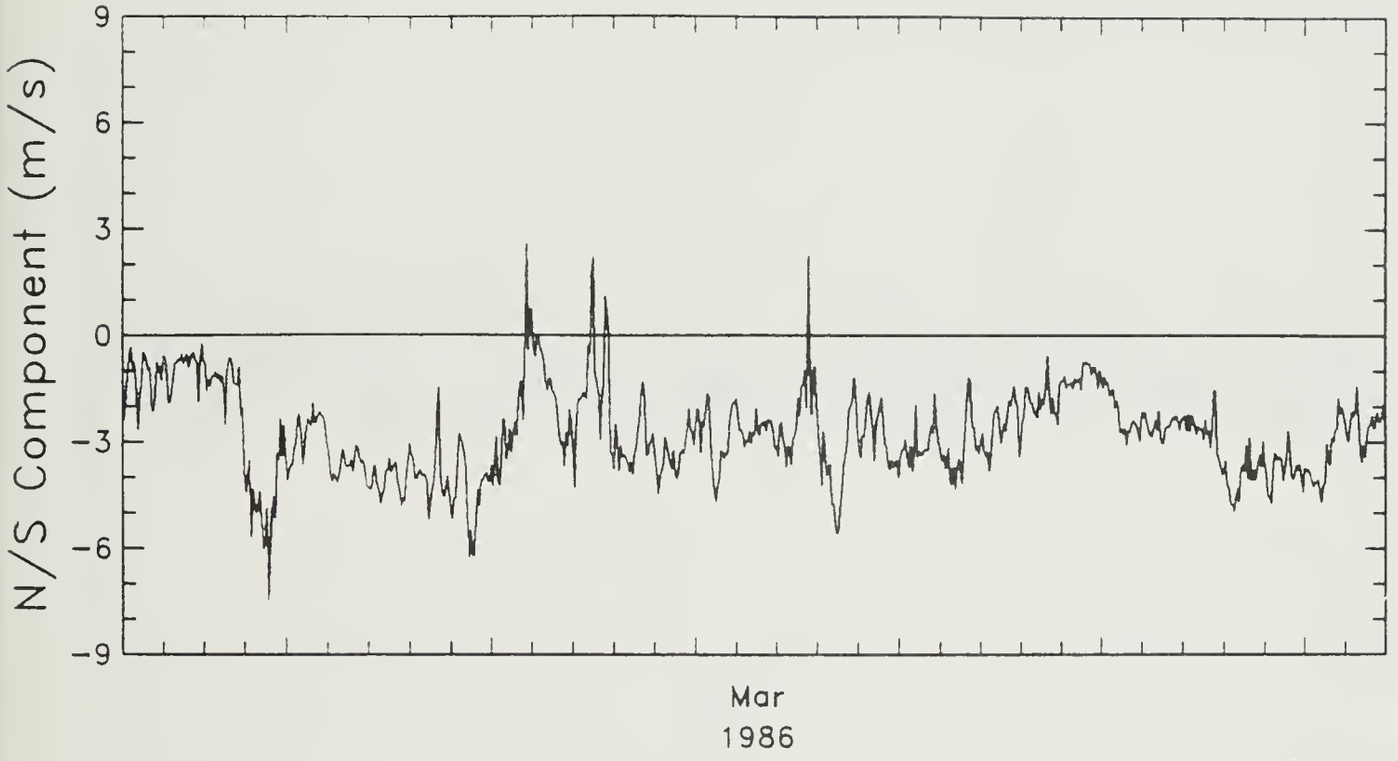

9
6
3
0
-3
-6
-9
N/S Component (m/s)
Feb
1986

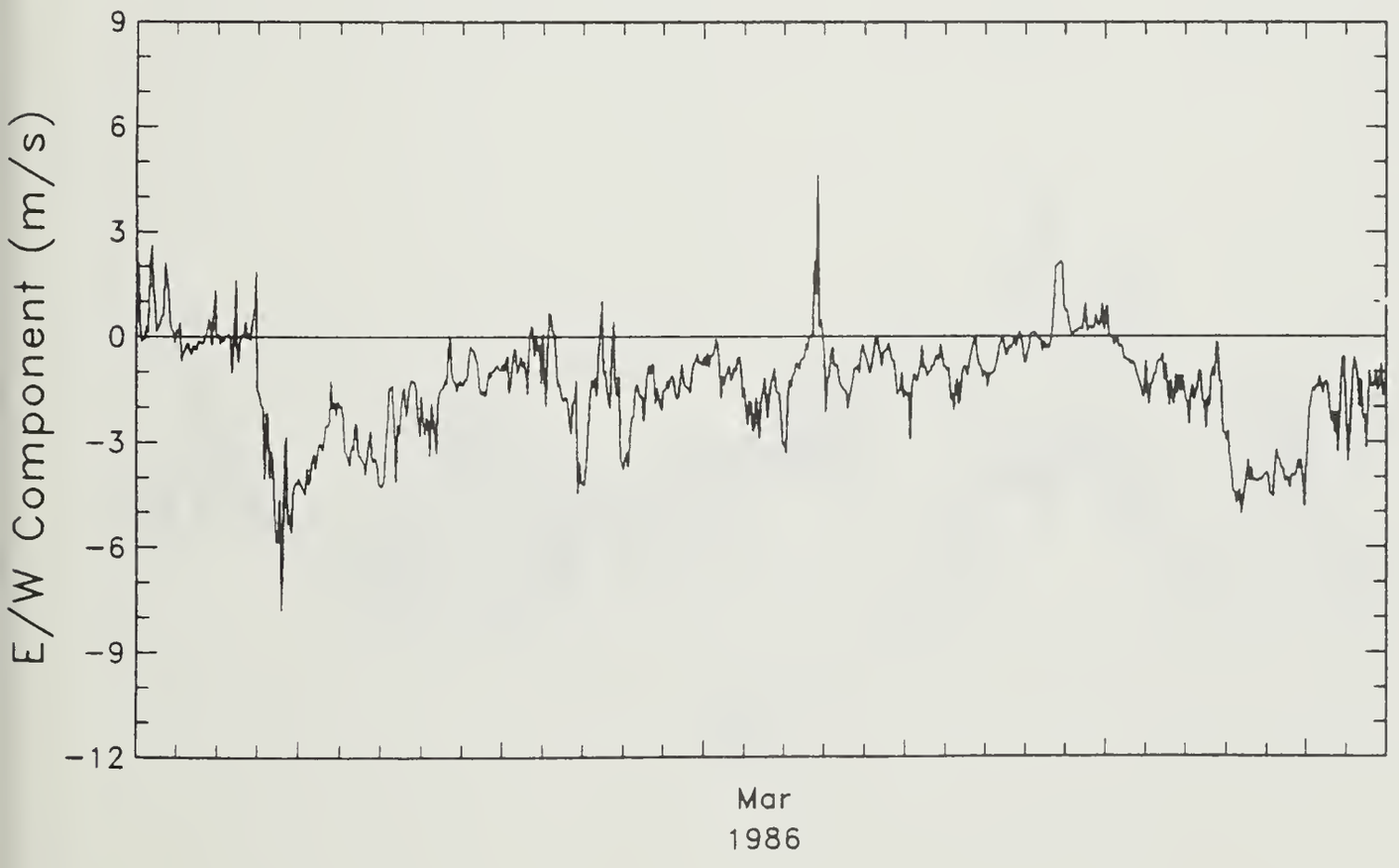

9
6
3
0
-3
-6
-9
-12
E/W Component (m/s)
Feb
1986

March 1986

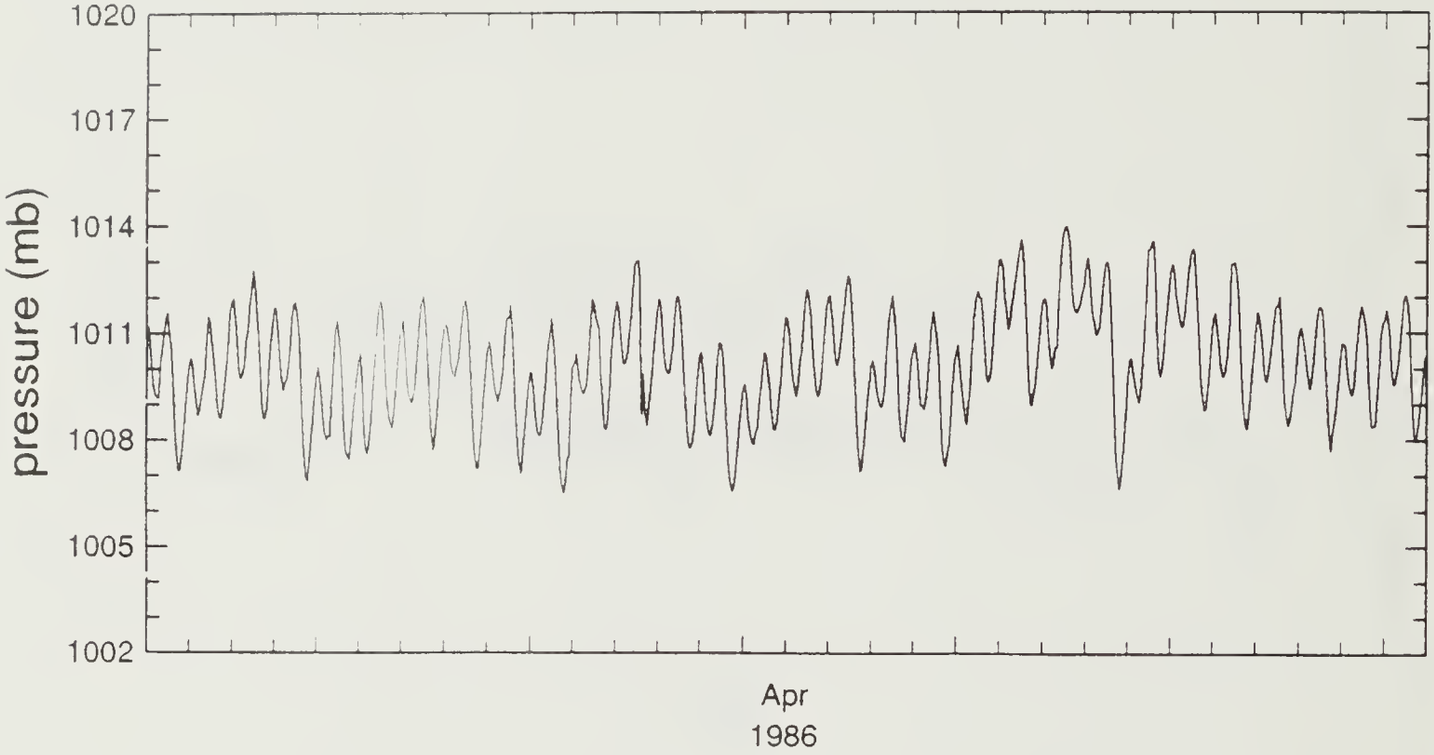

1020
1017
1014
1011
1008
1005
1002
Mar
1986

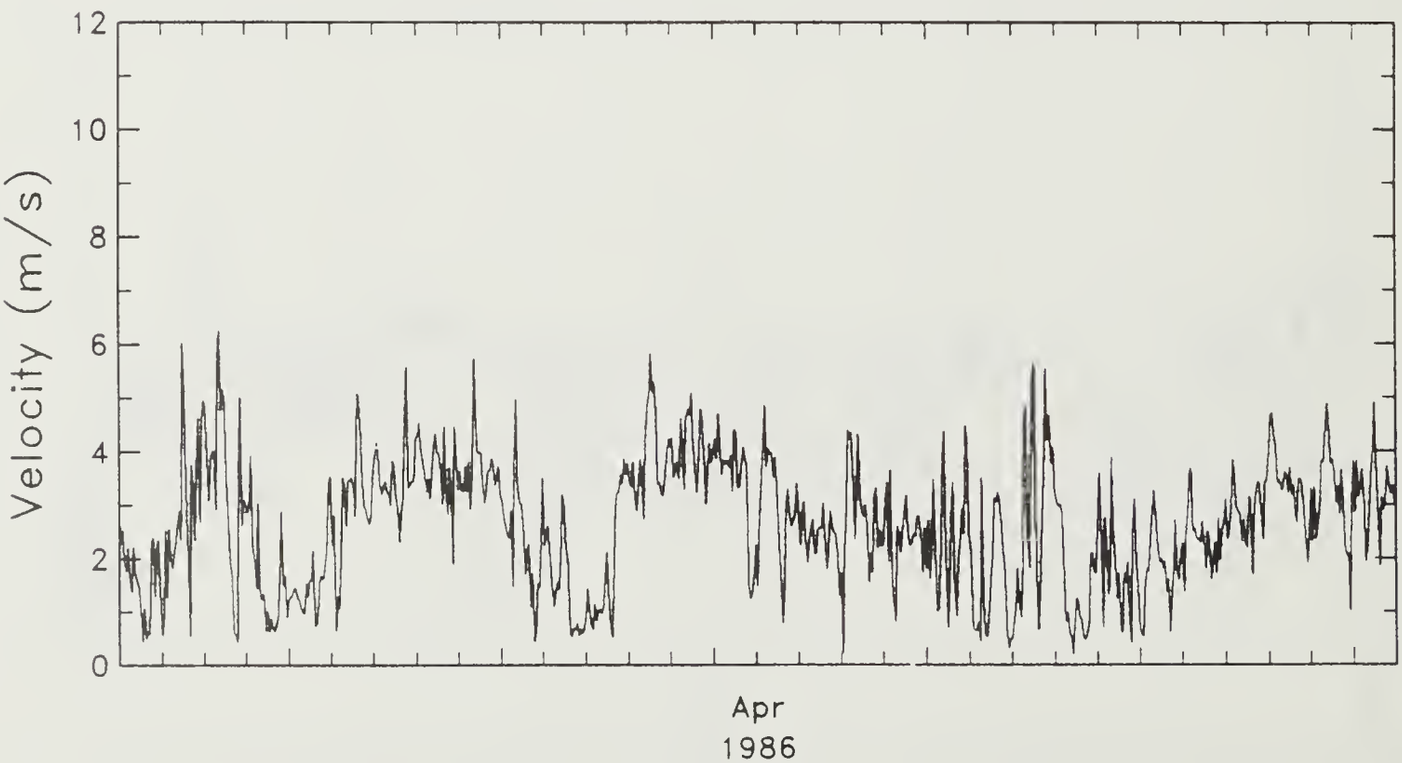

Velocity (m/s)
12
10
8
6
4
2
0
Mar
1986

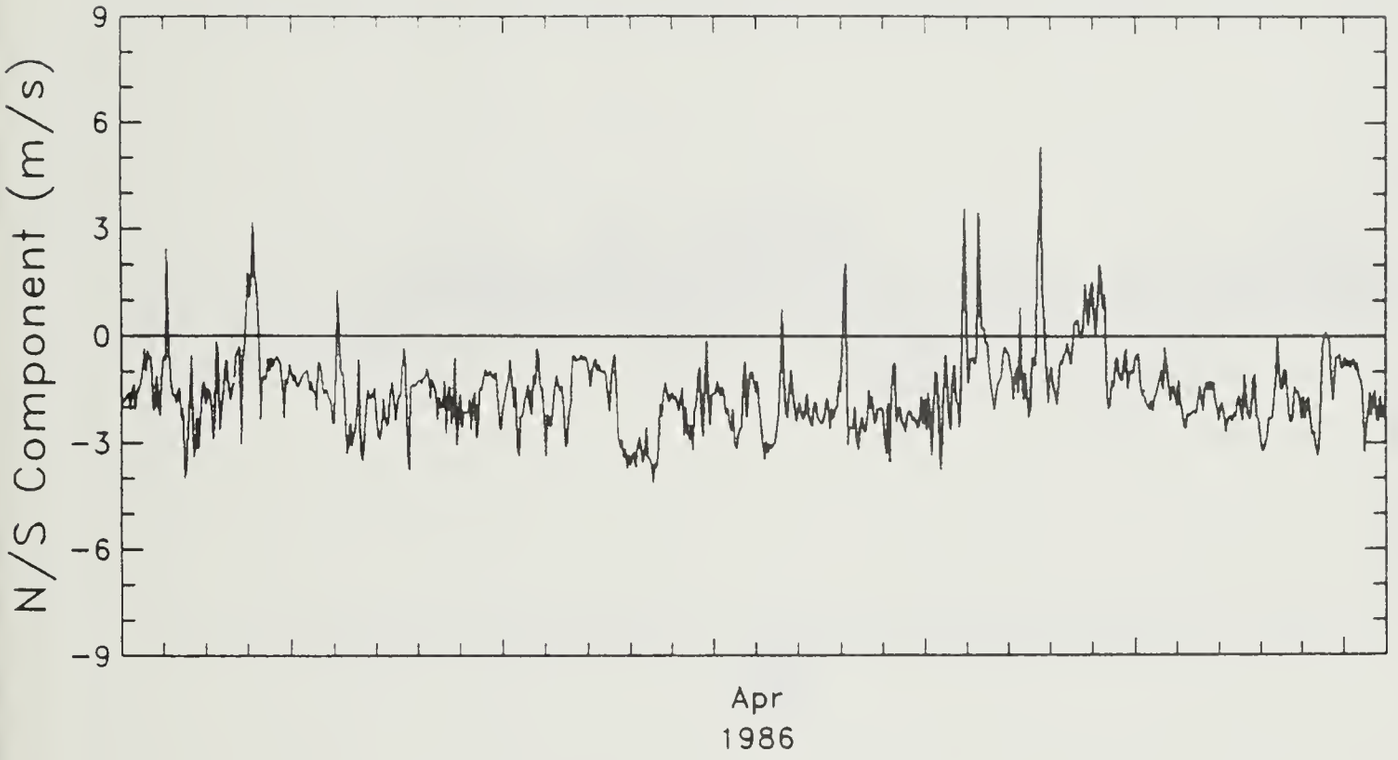

9
6
3
0
-3
-6
-9
N/S Component (m/s)
Mar
1986

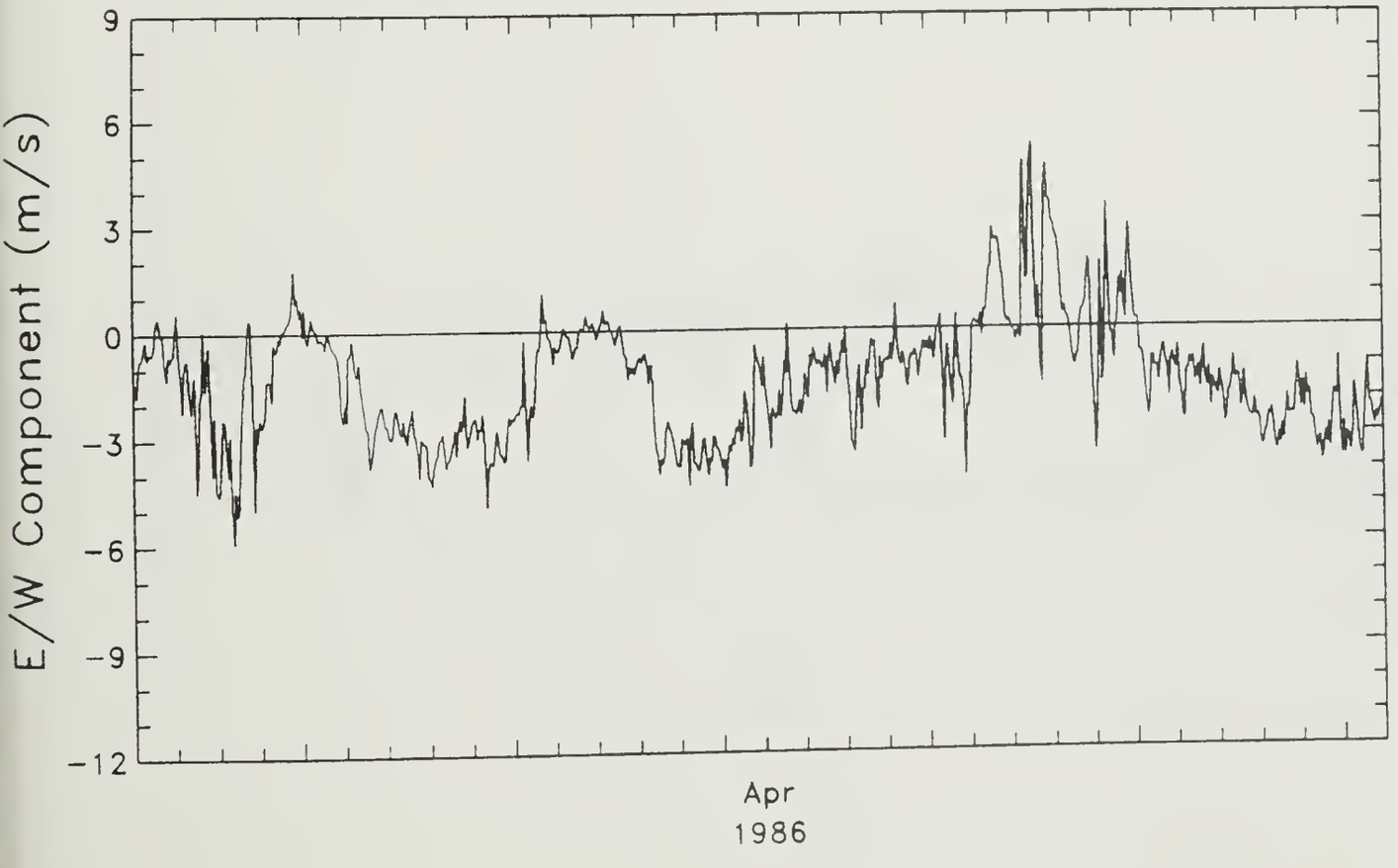

9
6
3
0
-3
-6
-9
-12
E/W Component (m/s)
Mar
1986

April 1986

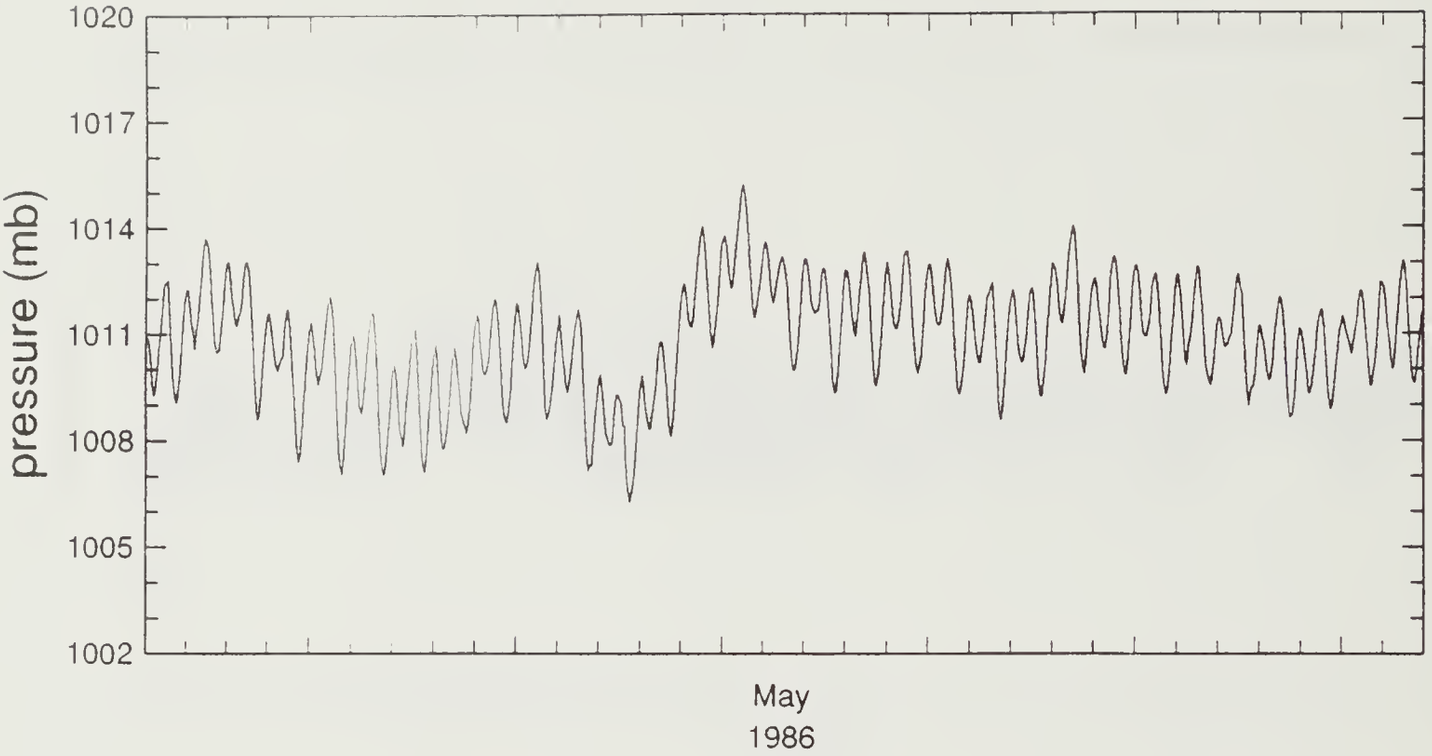

1020
1017
1014
1011
1008
1005
1002
pressure (mb)
Apr
1986

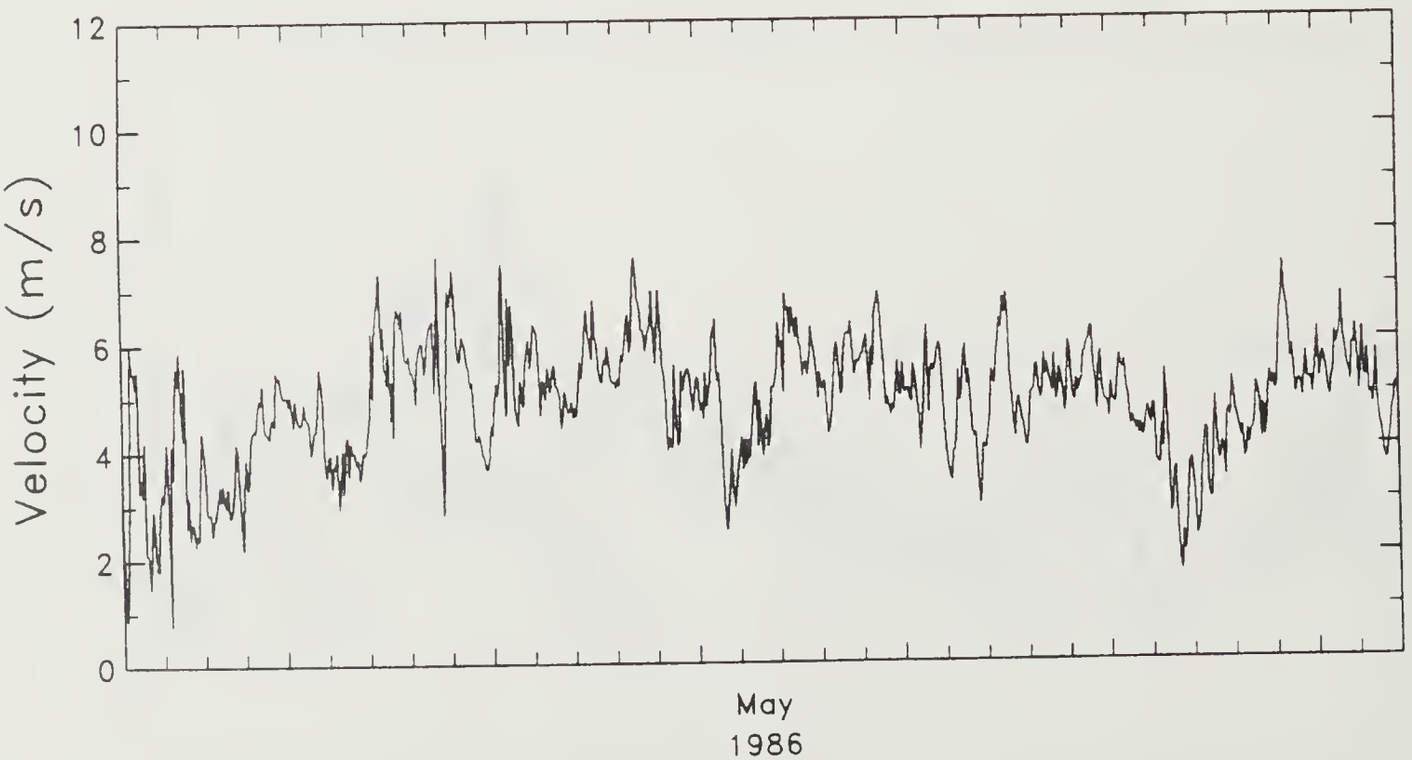

12
10
8
6
4
2
0
Velocity (m/s)
Apr
1986

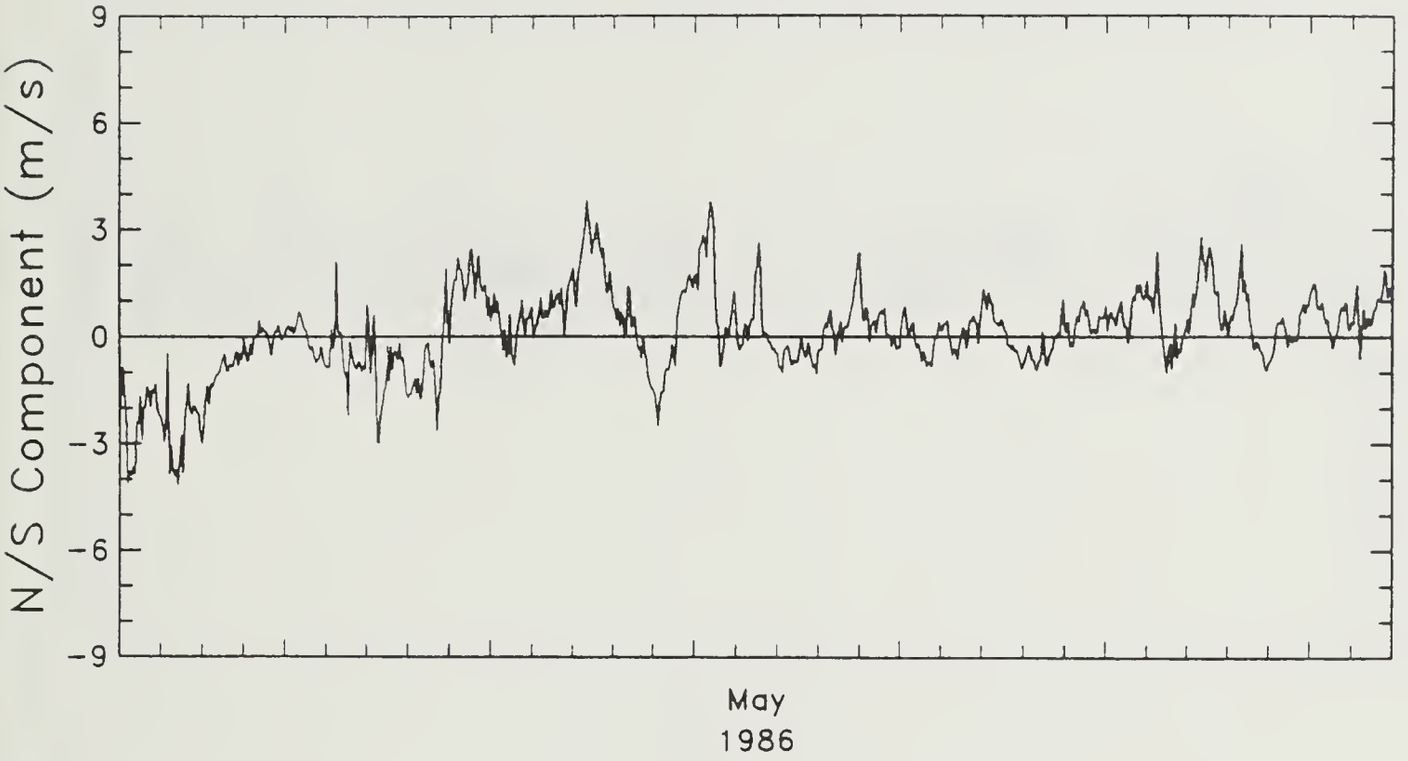

N/S Component (m/s)
9
6
3
0
-3
-6
-9
Apr
1986

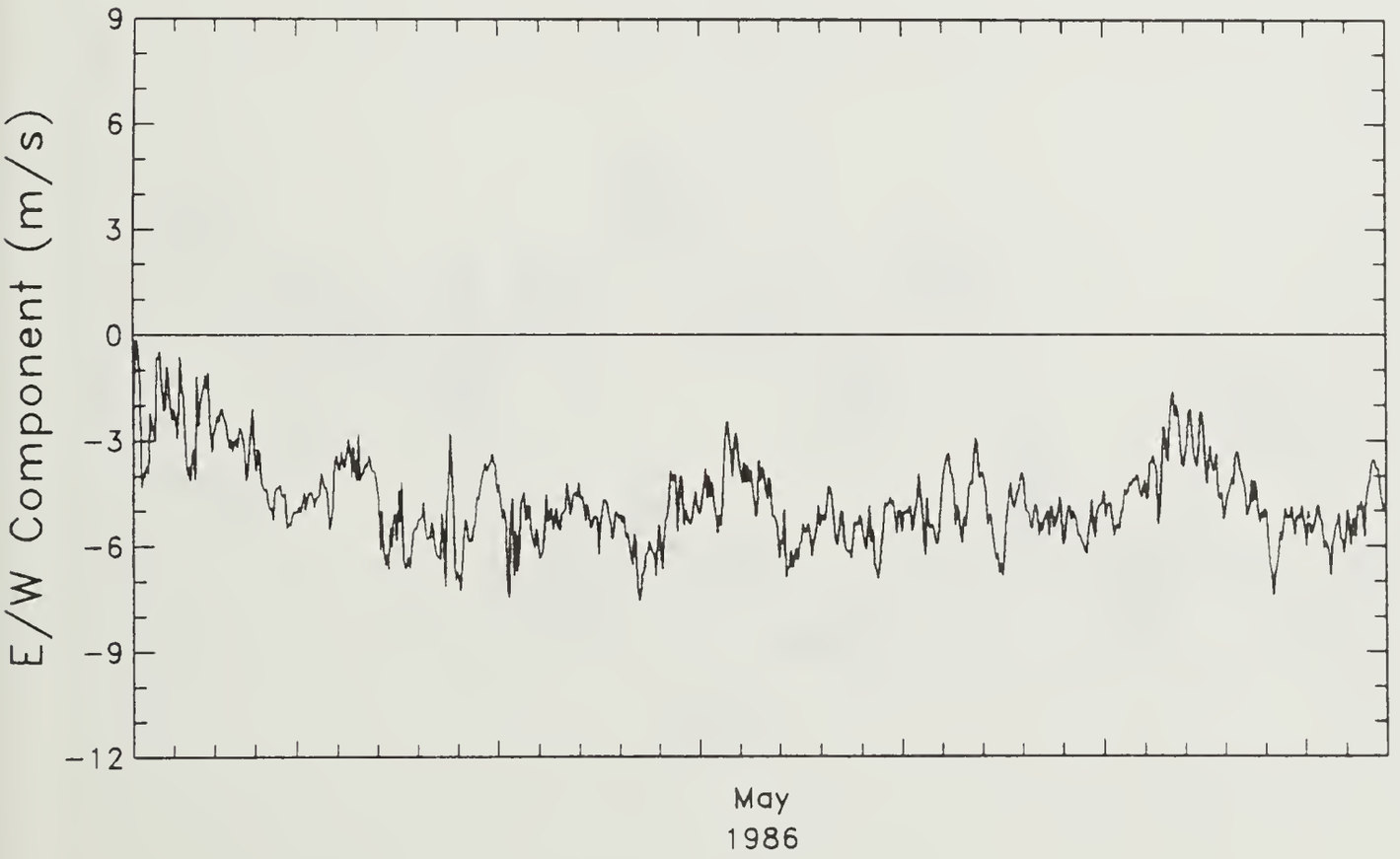

E/W Component (m/s)
9
6
3
0
-3
-6
-9
-12
Apr
1986

May 1986

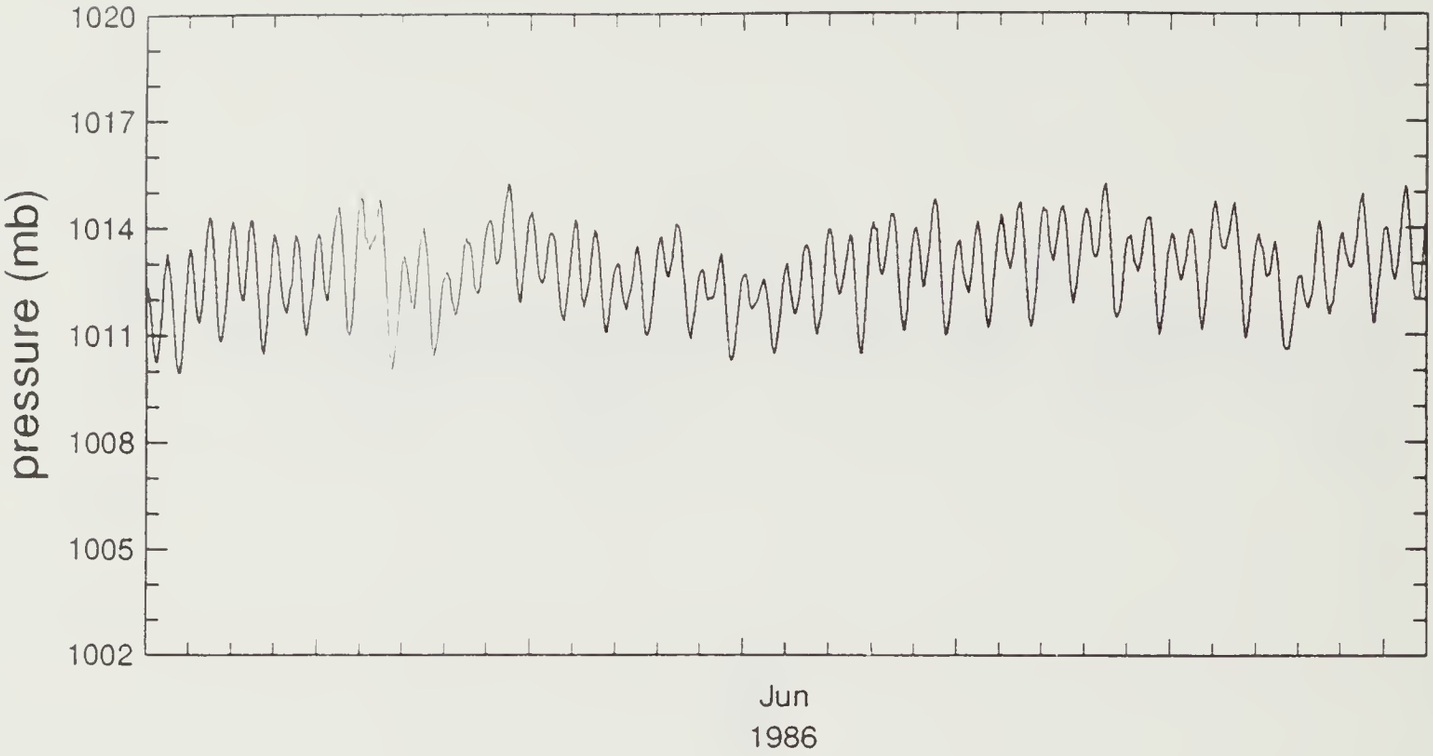

1020
1017
1014
1011
1008
1005
1002
pressure (mb)
May
1986

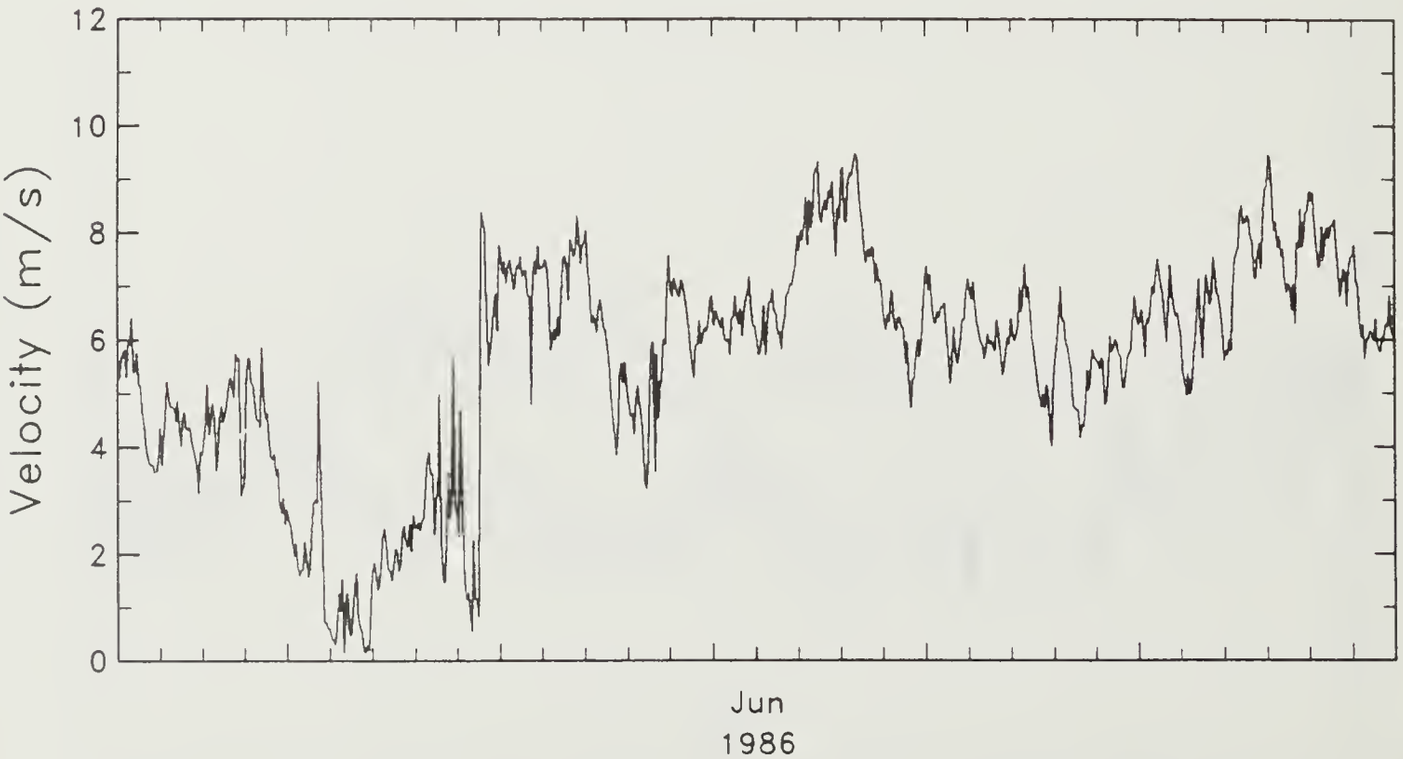

12
10
8
6
4
2
0
Velocity (m/s)
May
1986

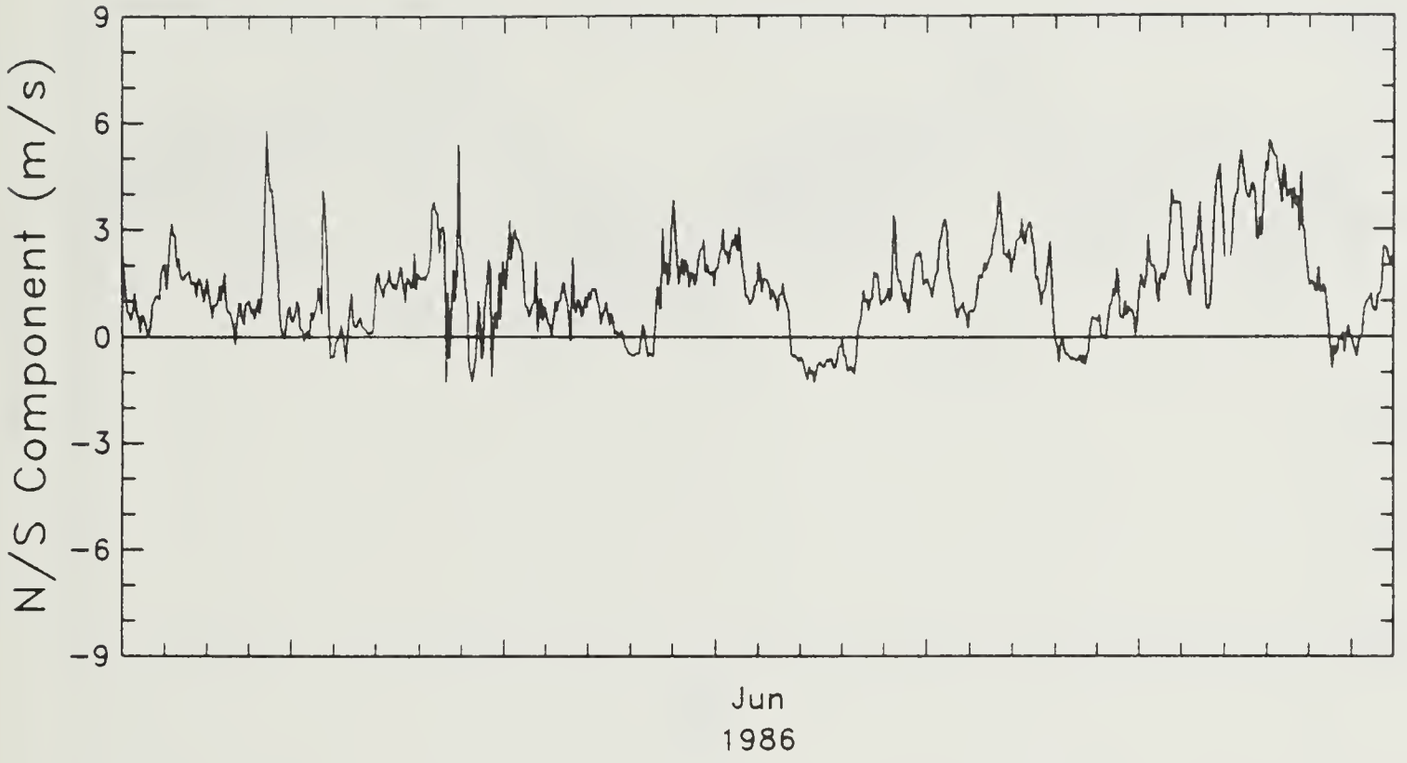

N/S Component (m/s)
9
6
3
0
-3
-6
-9
May
1986


E/W Component (m/s)
9
6
3
0
-3
-6
-9
-12
May
1986

June 1986


1020
1017
1014
1011
1008
1005
1002
pressure (mb)
Jun
1986


12
10
8
6
4
2
0
Velocity (m/s)
Jun
1986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N/S Component (m/s)
Jun
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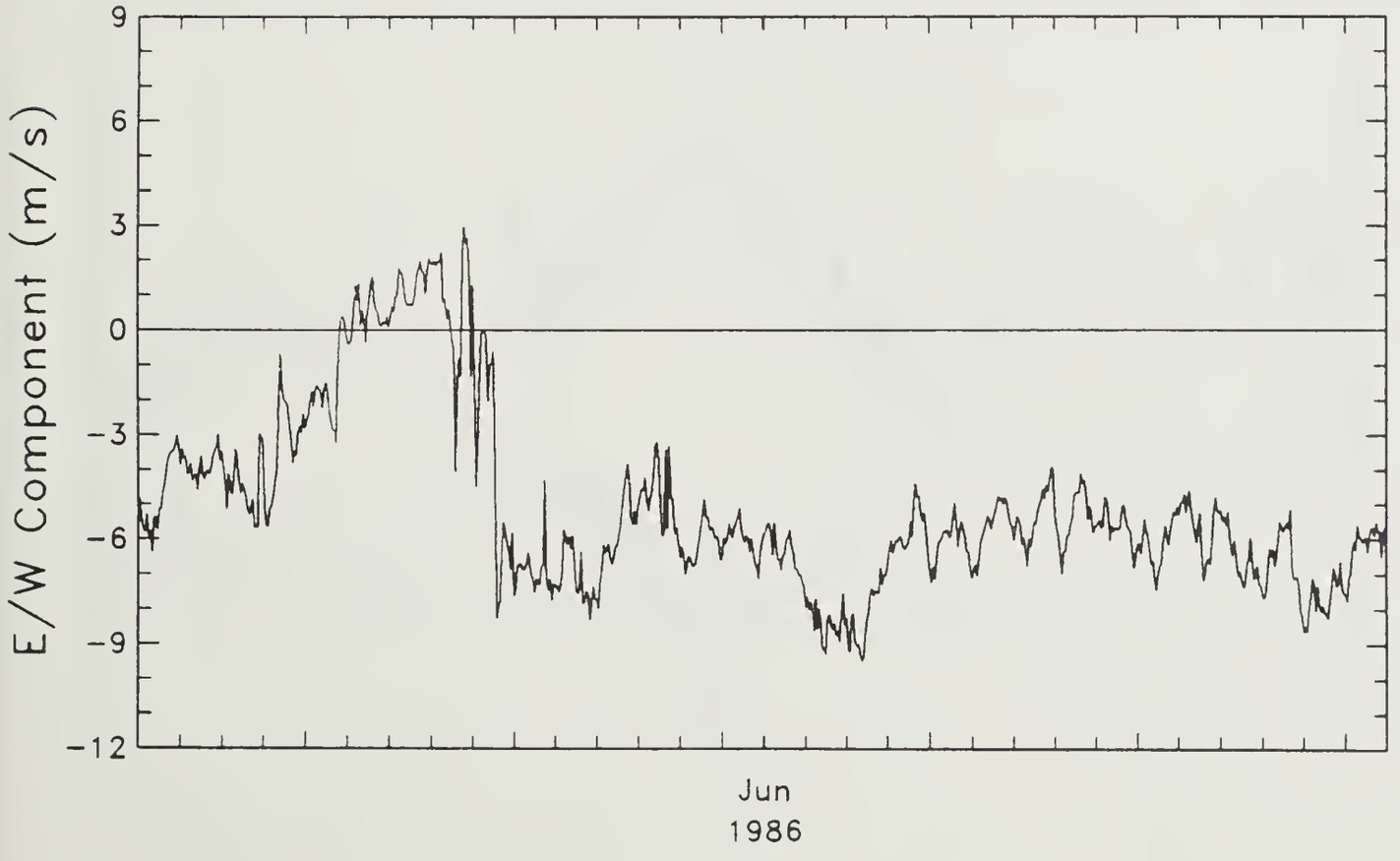
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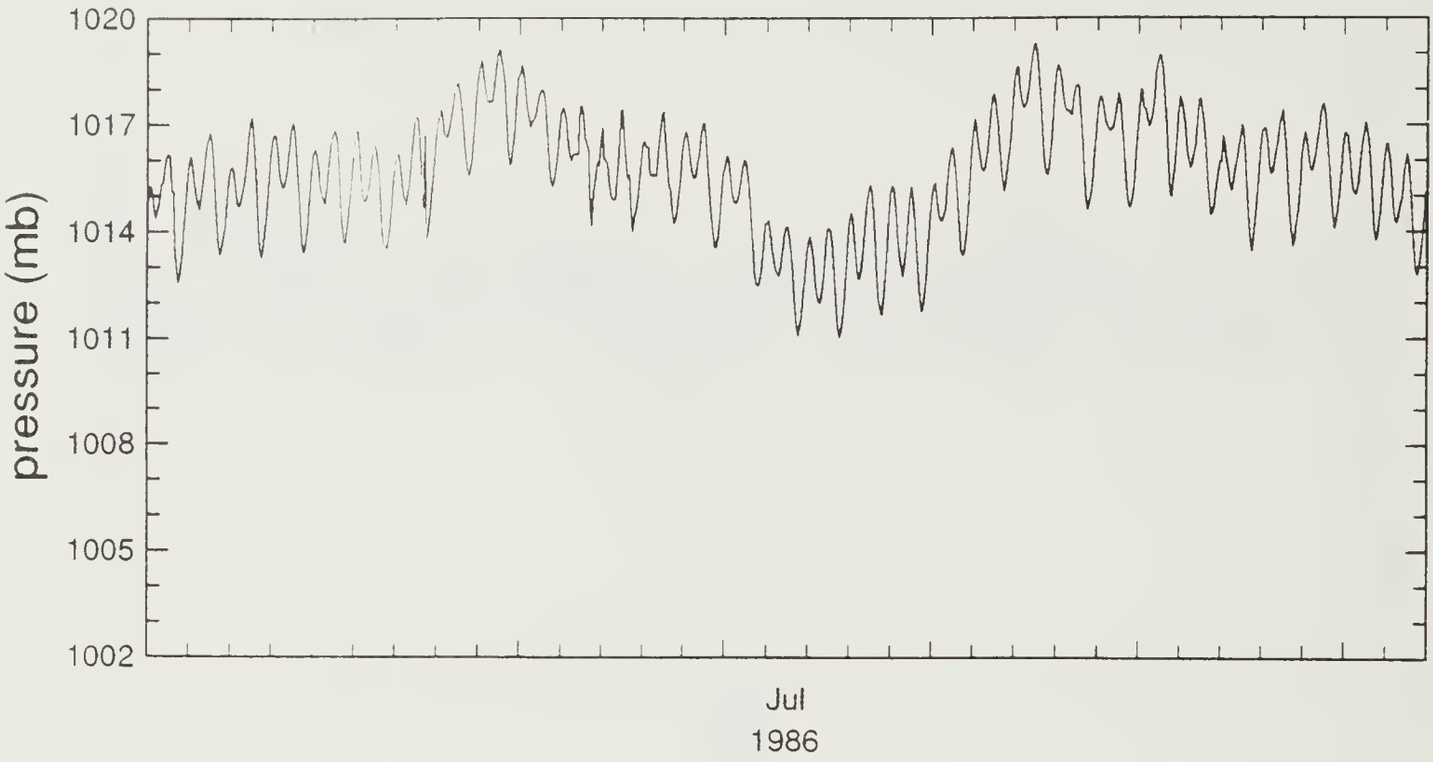
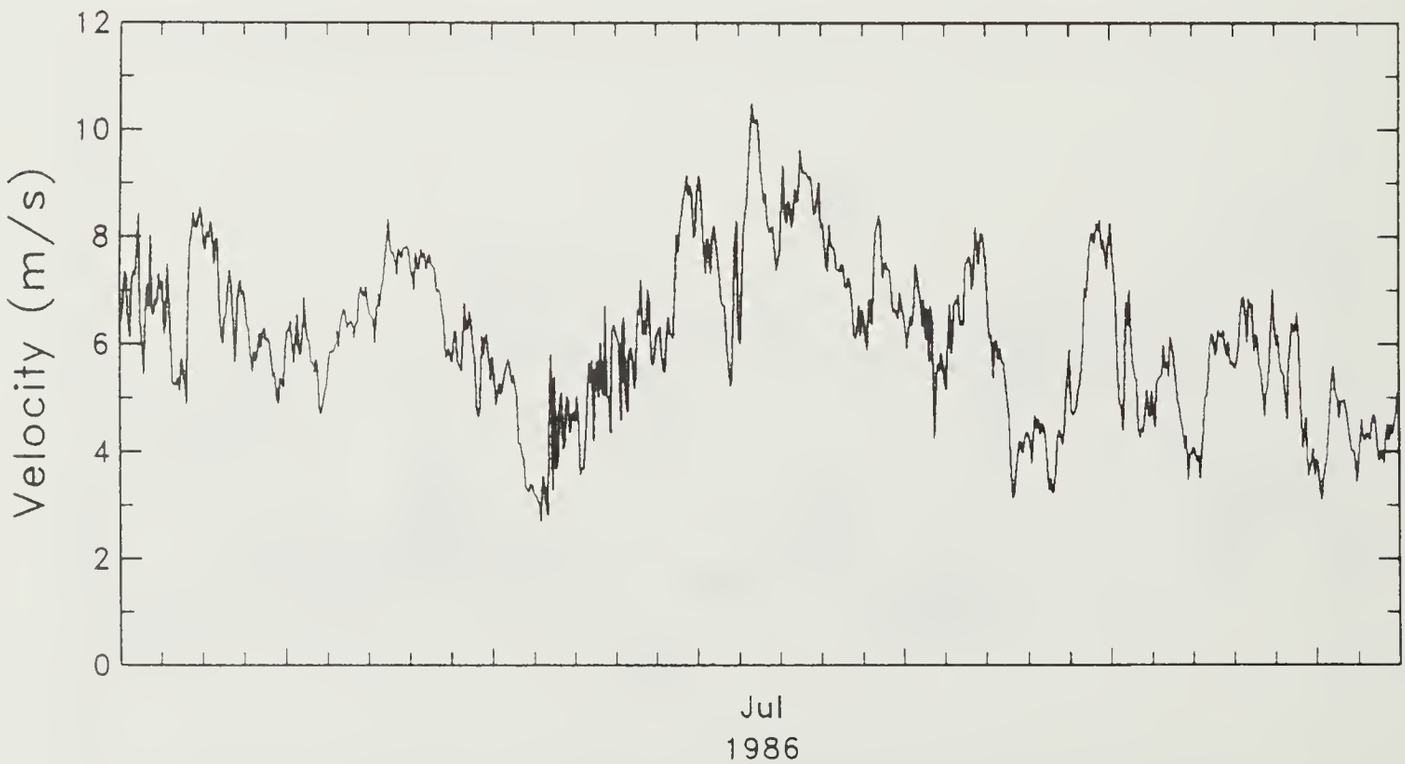
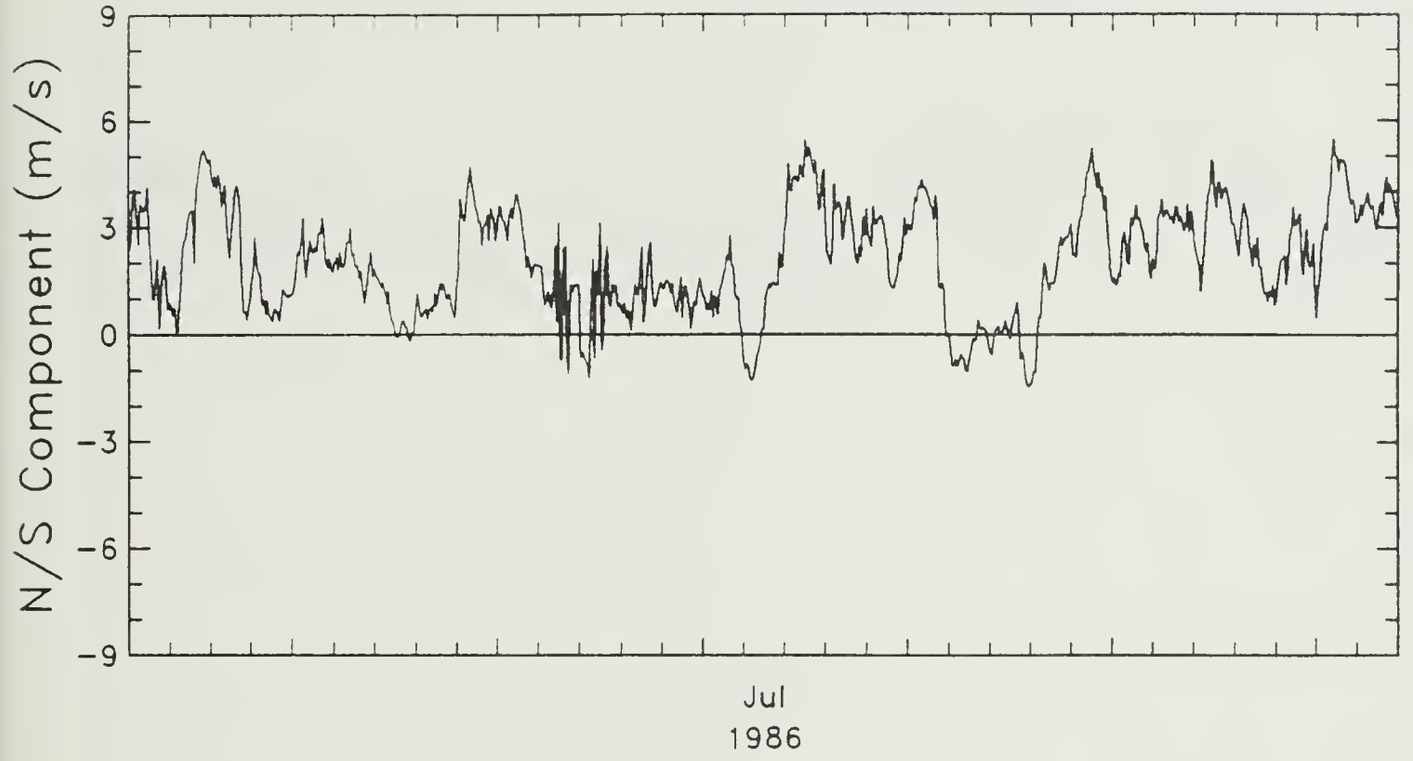
E/W Component (m/s)
Jun
1986

July 1986


pressure (mb)
1020
1017
1014
1011
1008
1005
1002
Jul
1986


Velocity (m/s)
12
10
8
6
4
2
0
Jul
1986


N/S Component (m/s)
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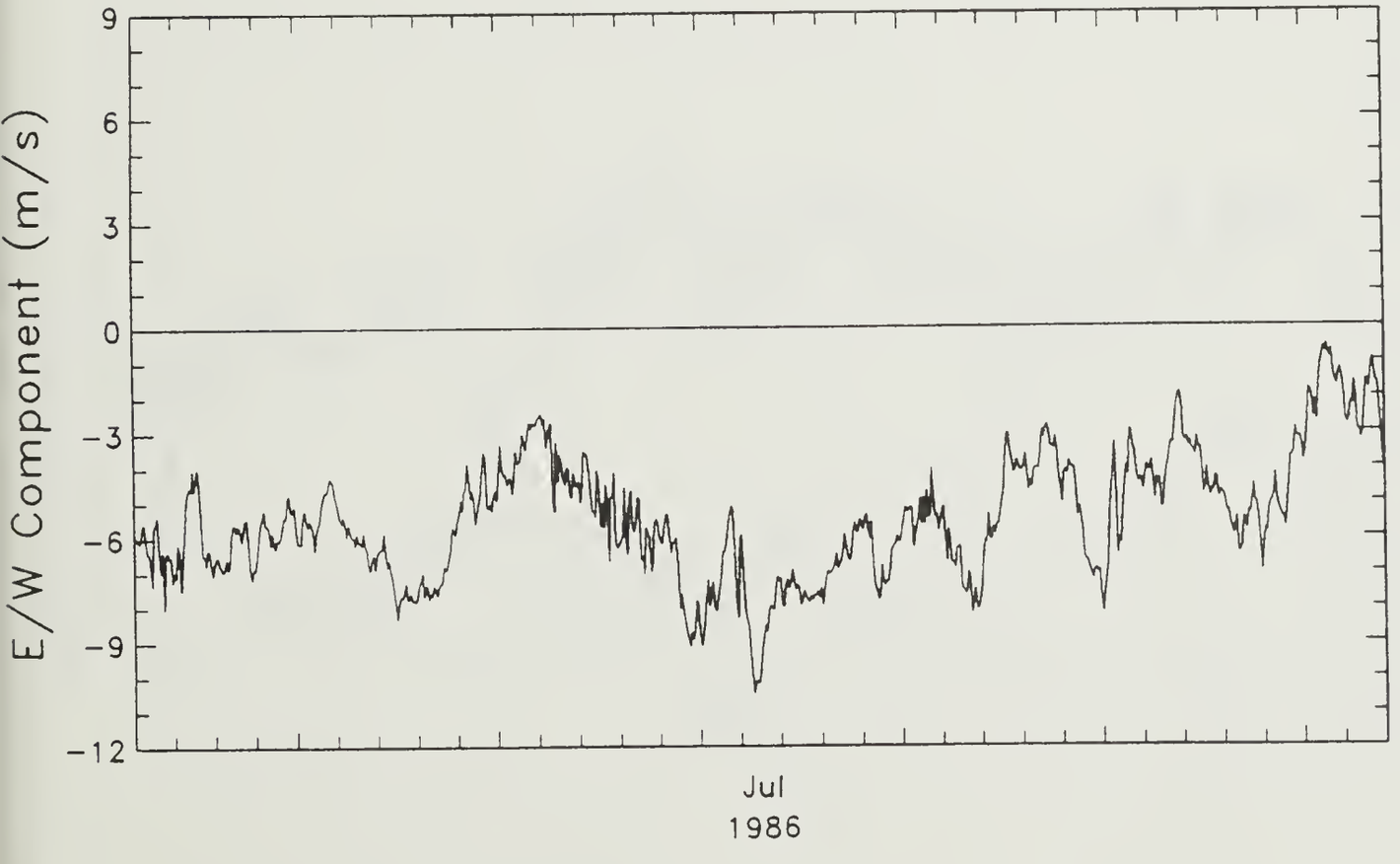
E/W Component (m/s)
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-9
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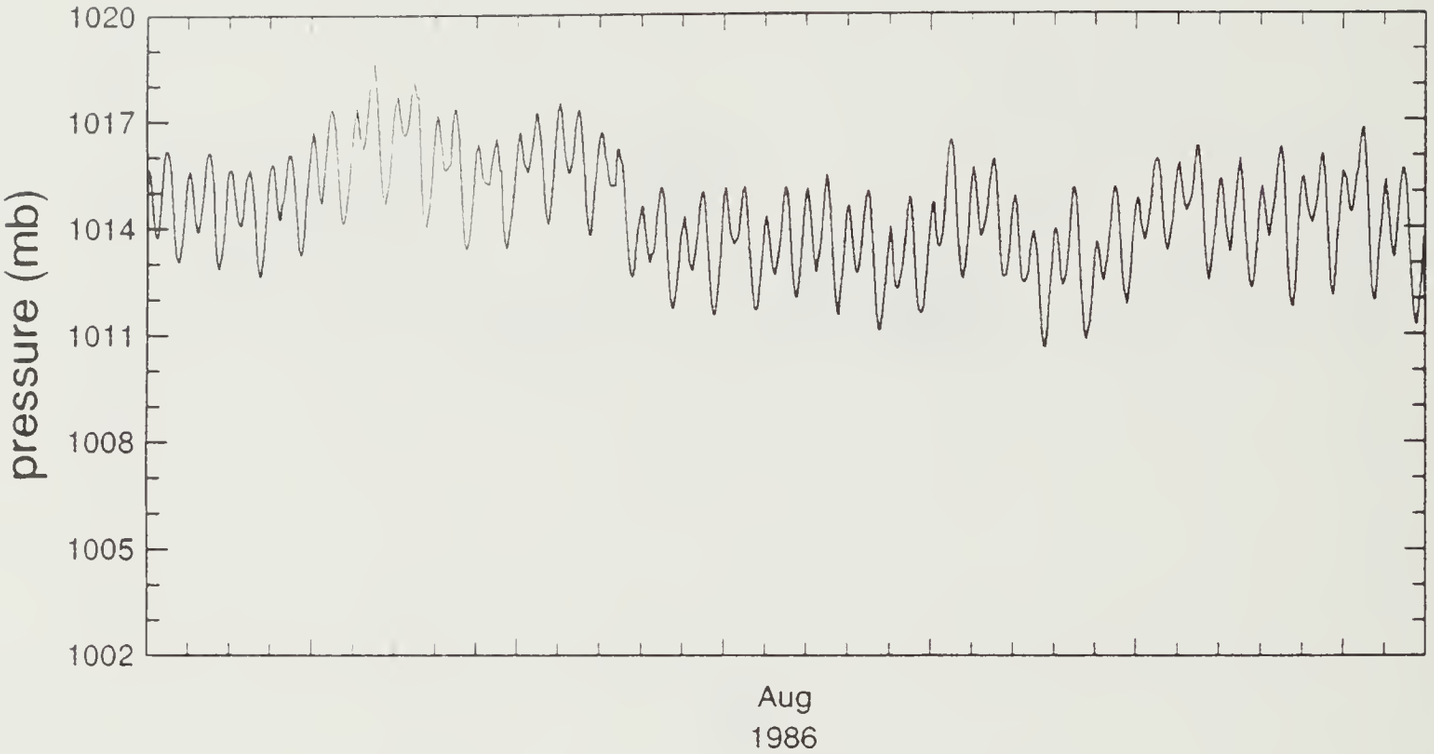
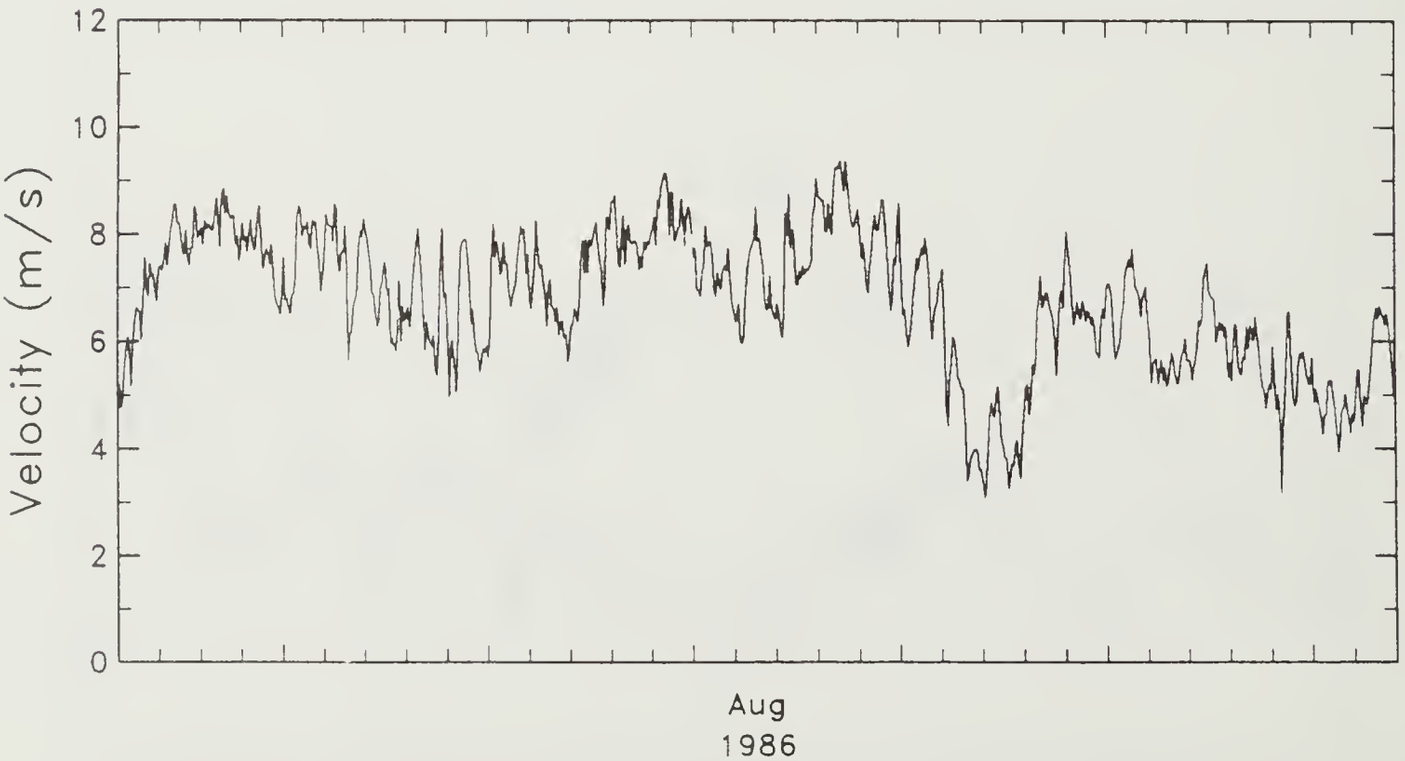
Jul
1986

August 1986


1020
1017
1014
1011
1008
1005
1002
pressure (mb)
Aug
1986


12
10
8
6
4
2
0
Velocity (m/s)
Aug
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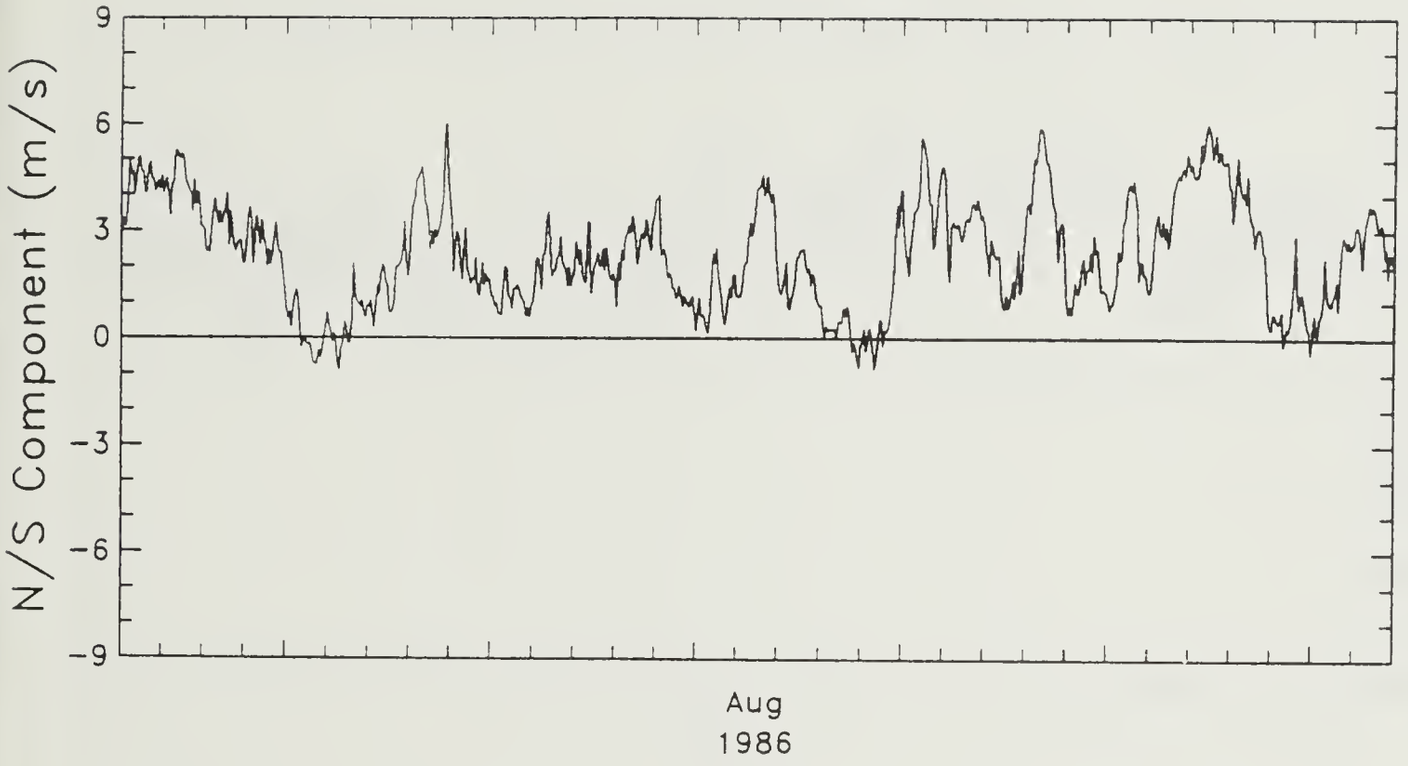
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-6
-9
Aug
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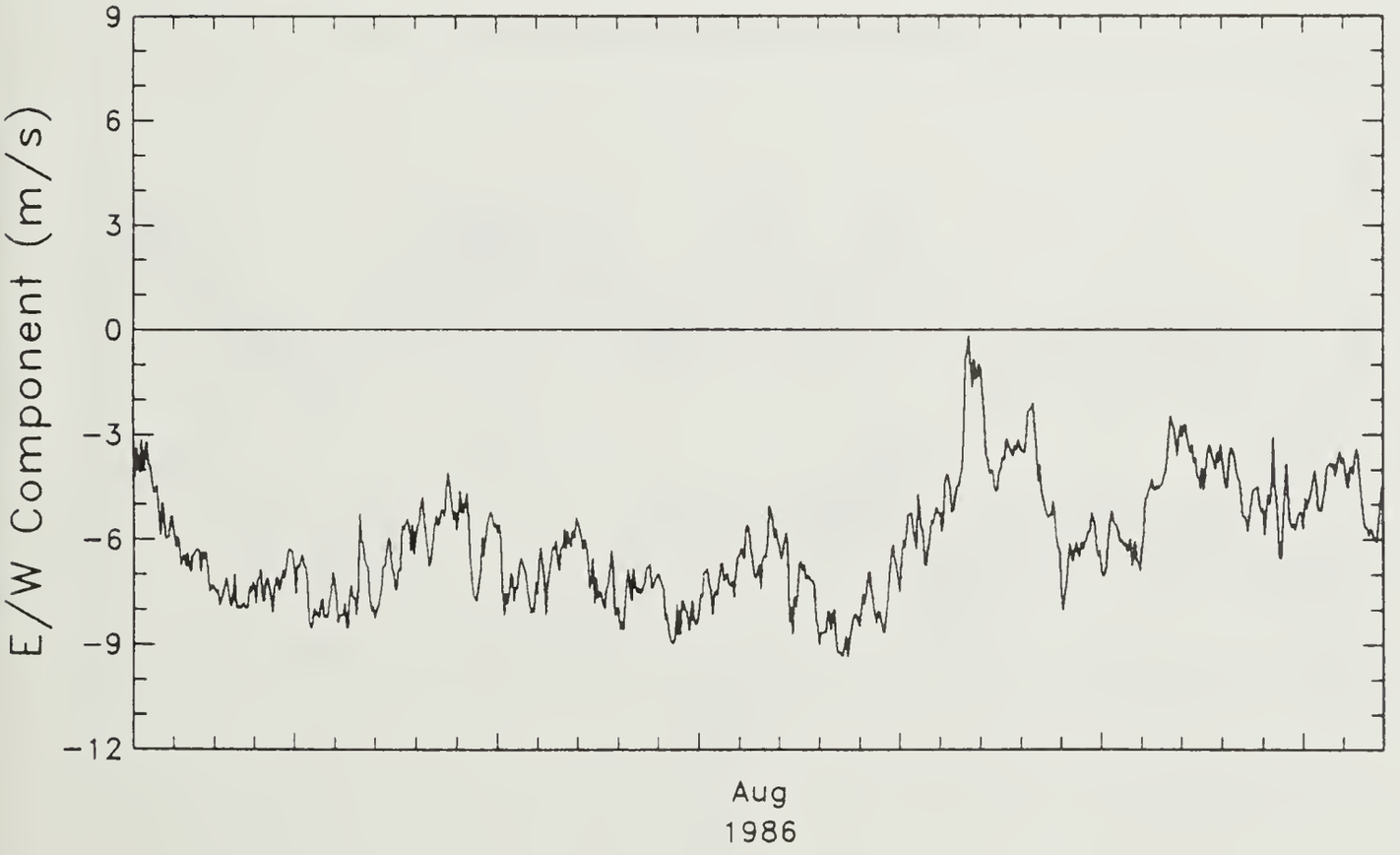
E/W Component (m/s)
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-9
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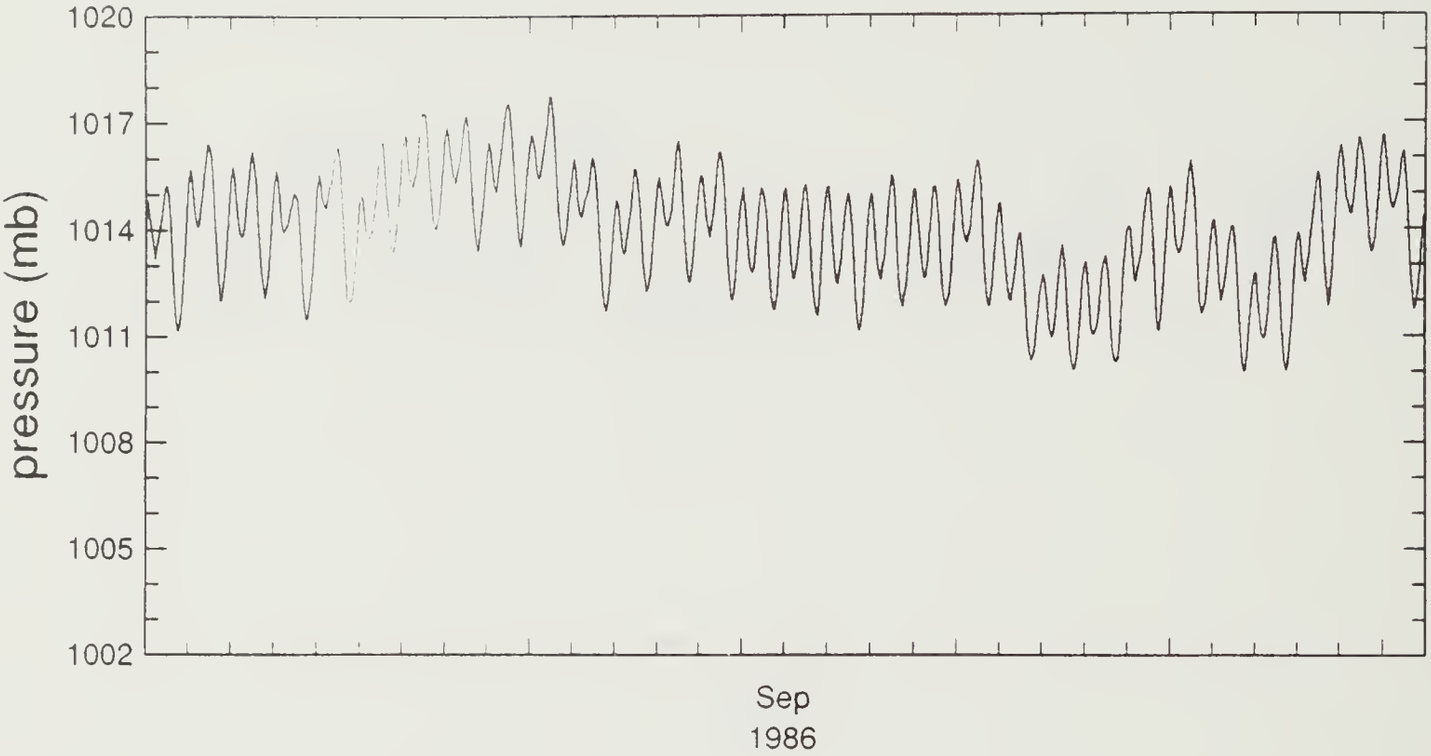
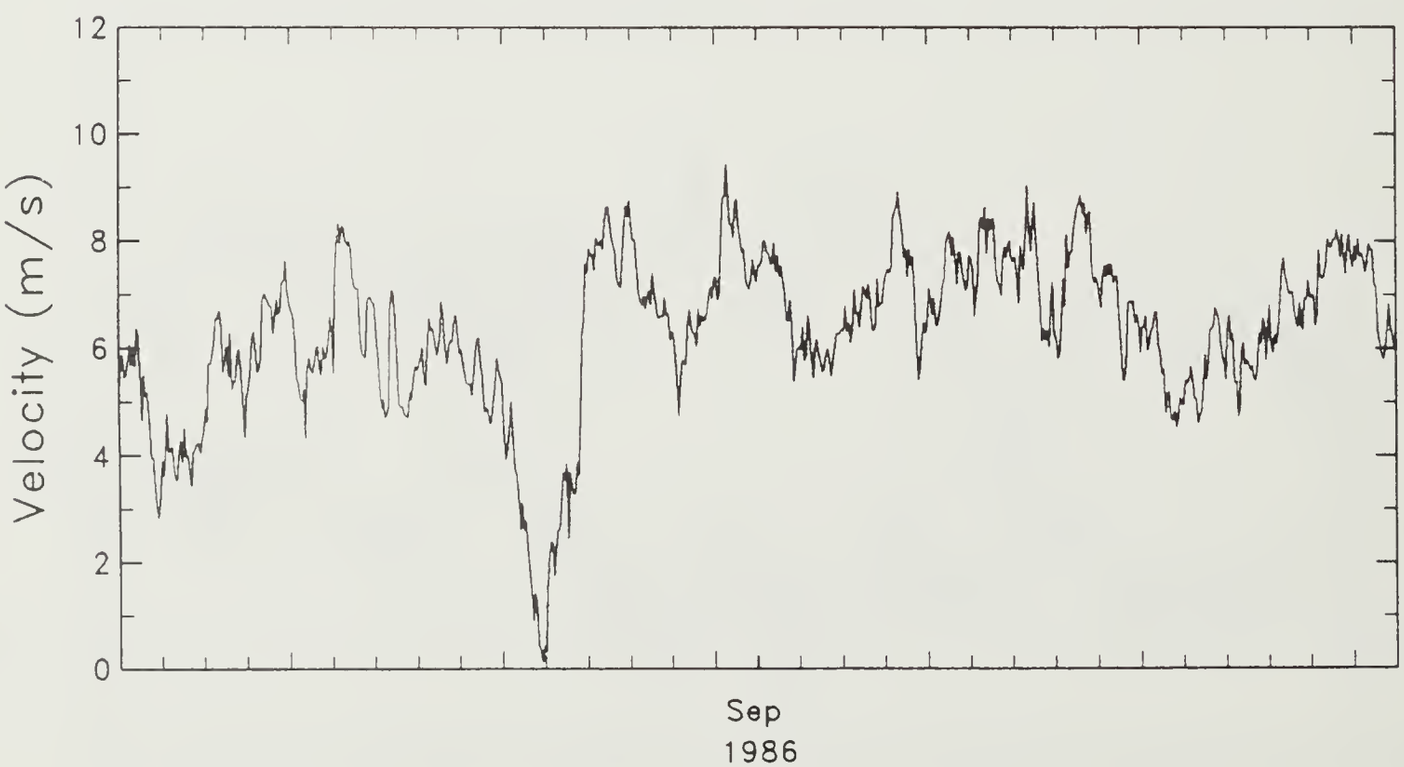
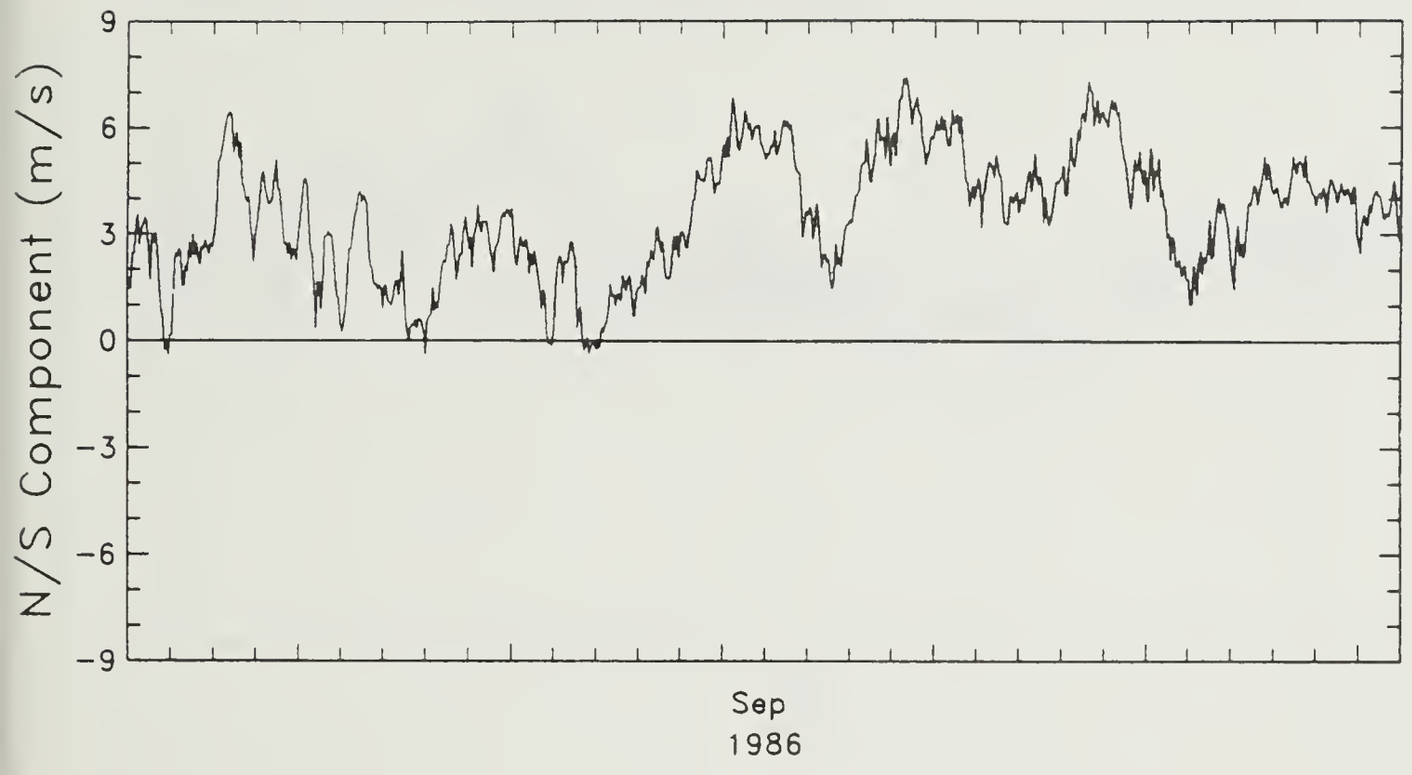
Aug
1986

September 1986



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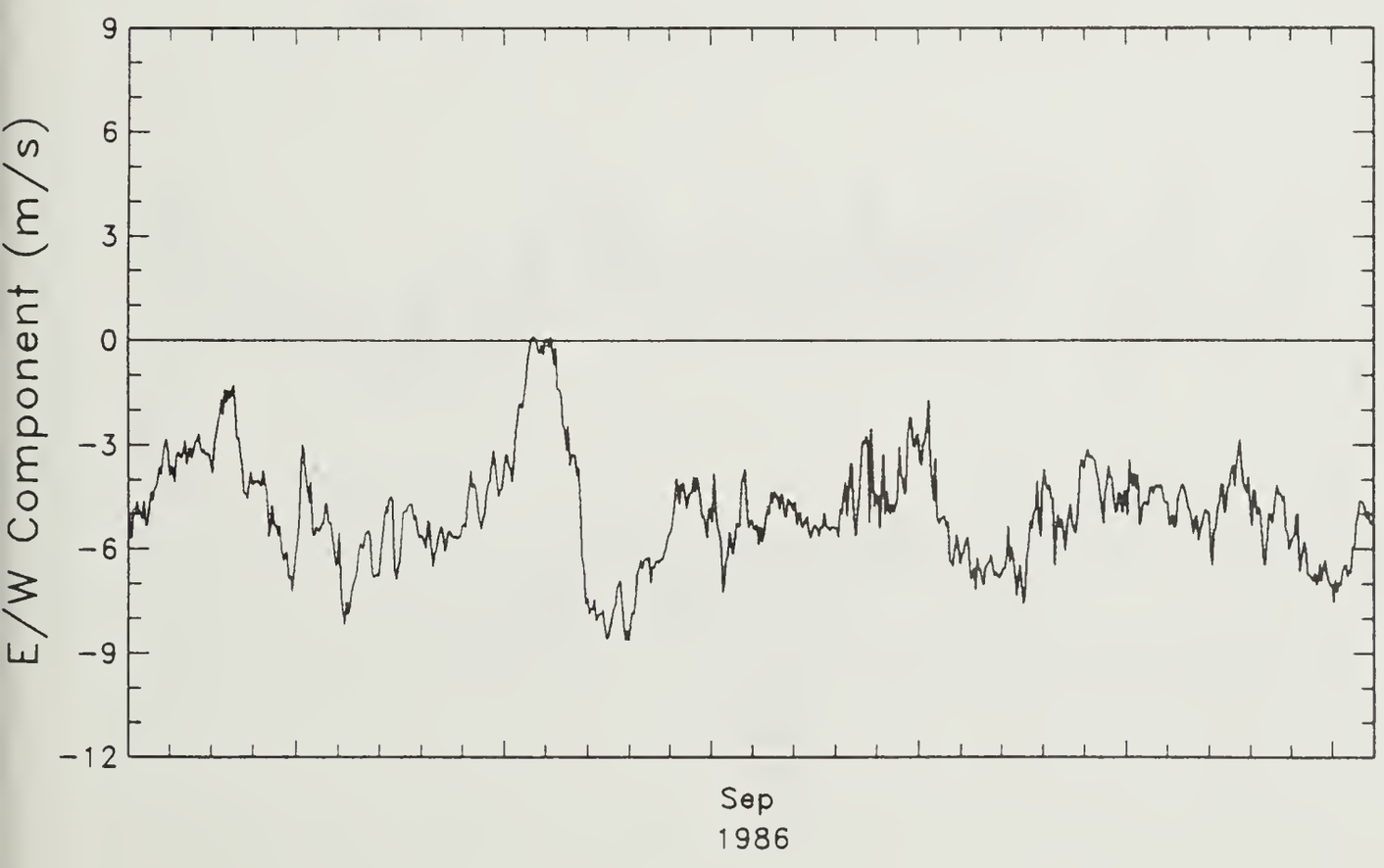
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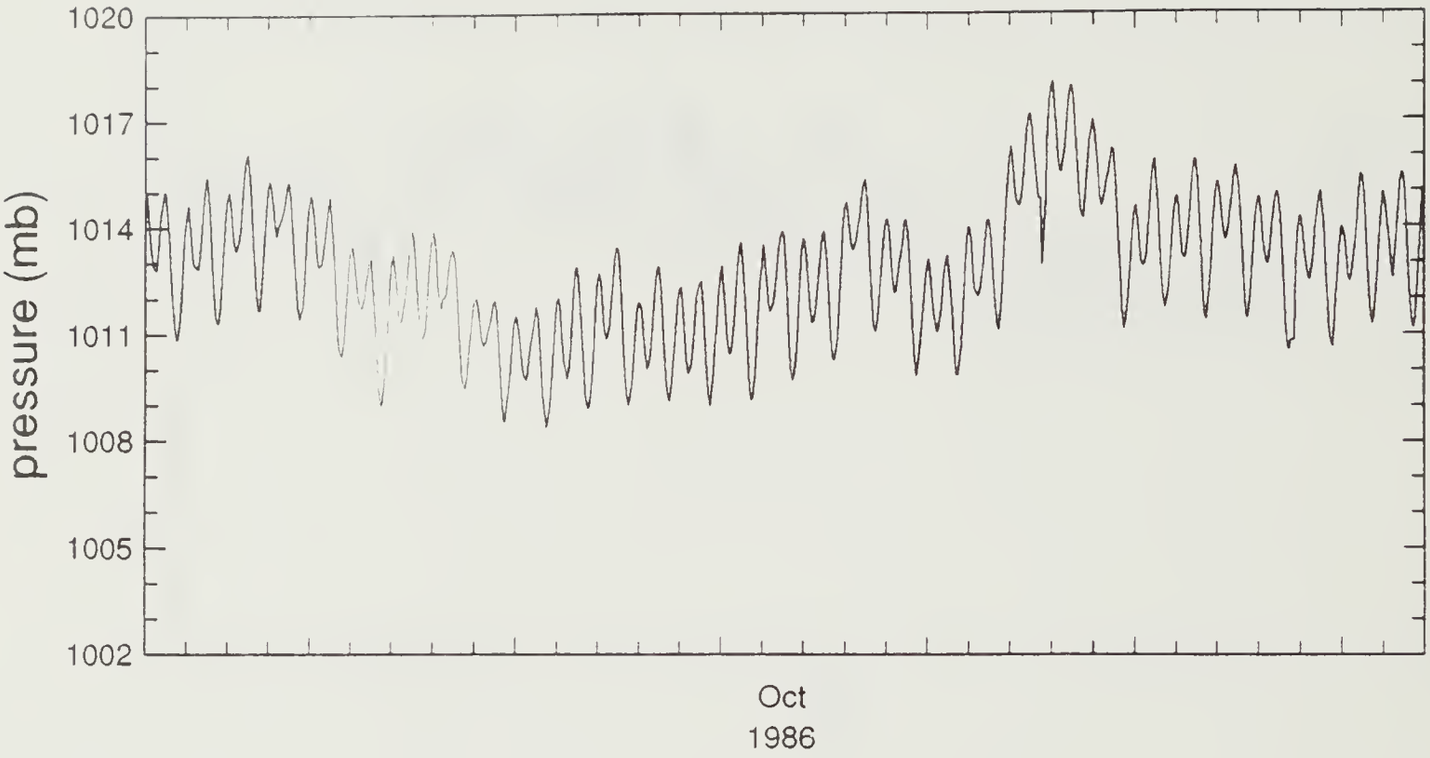
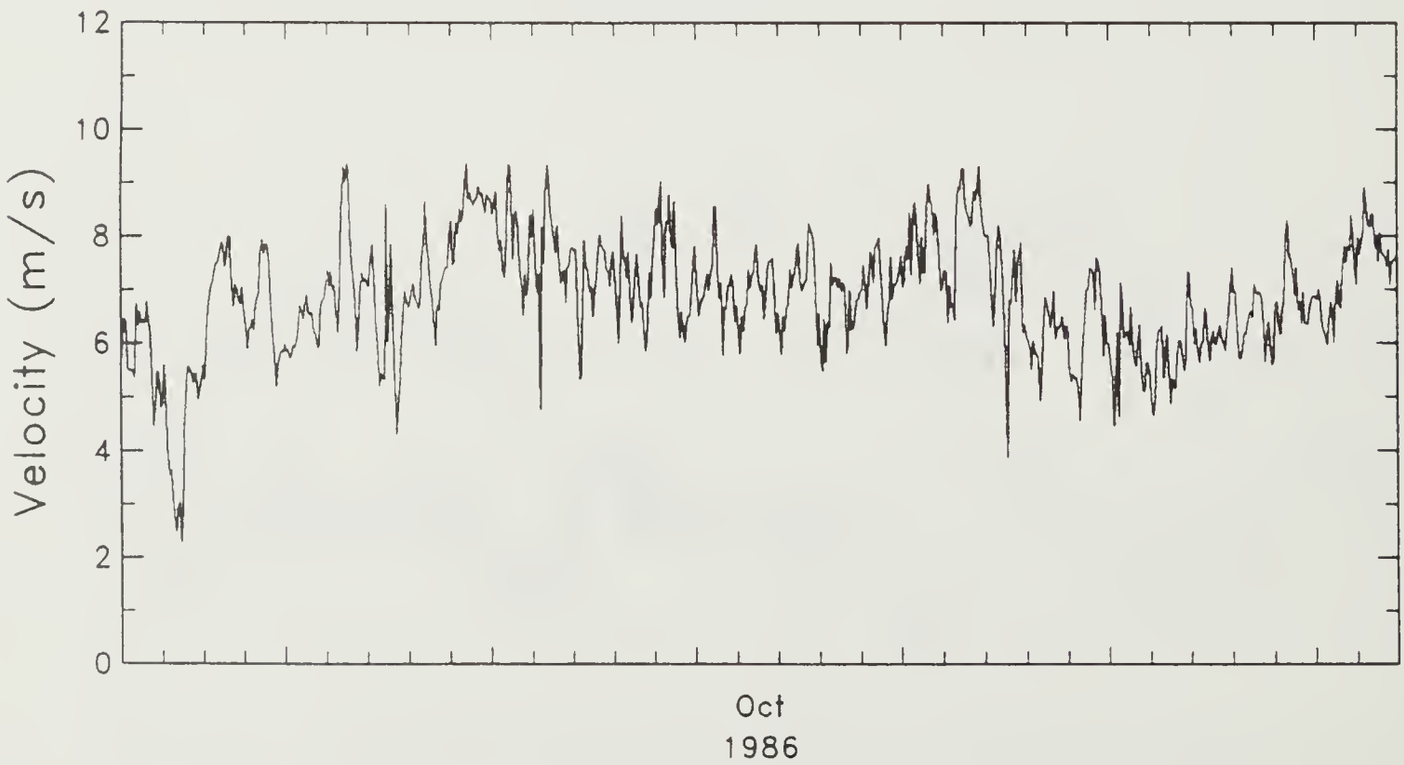
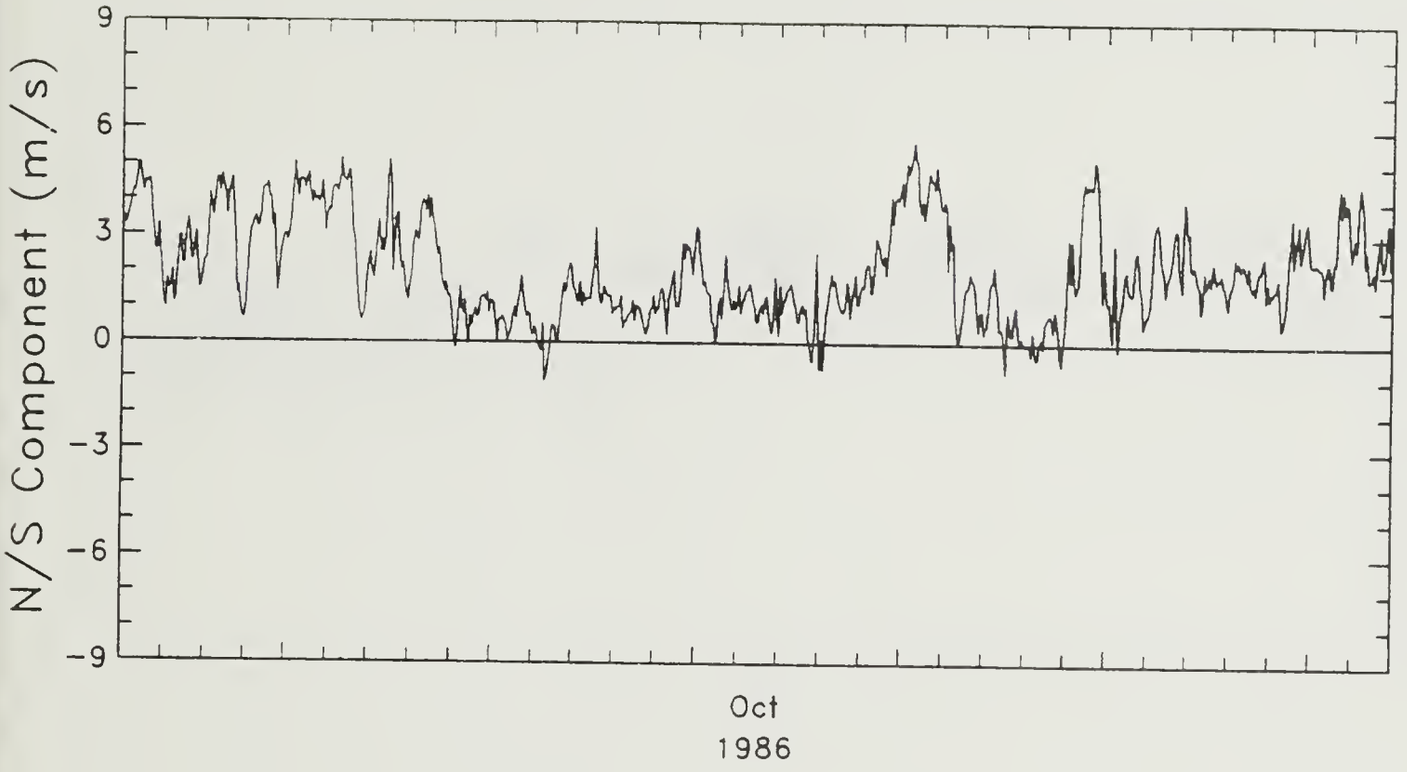
E/W Component (m/s)
Sep
1986

October 1986



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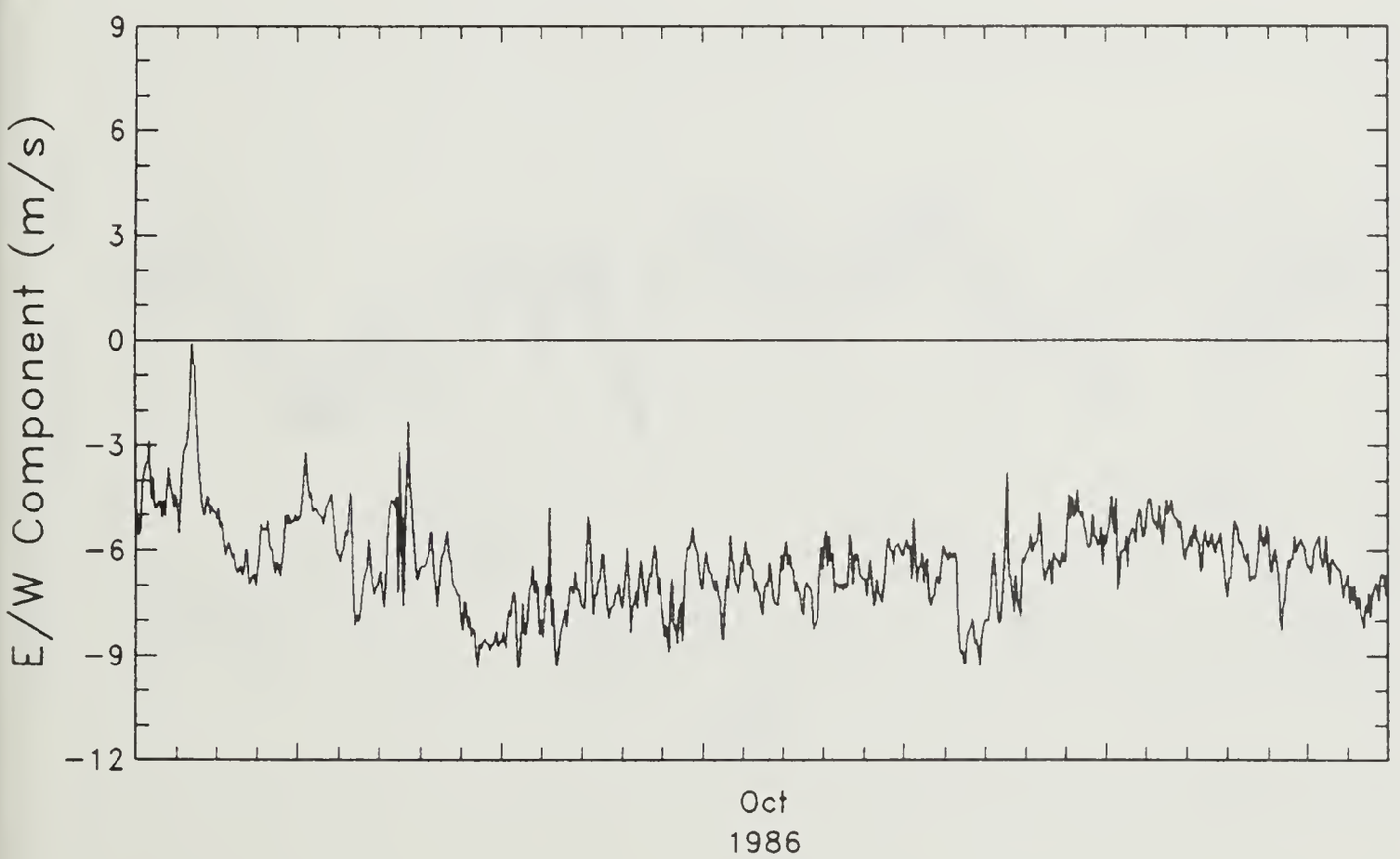
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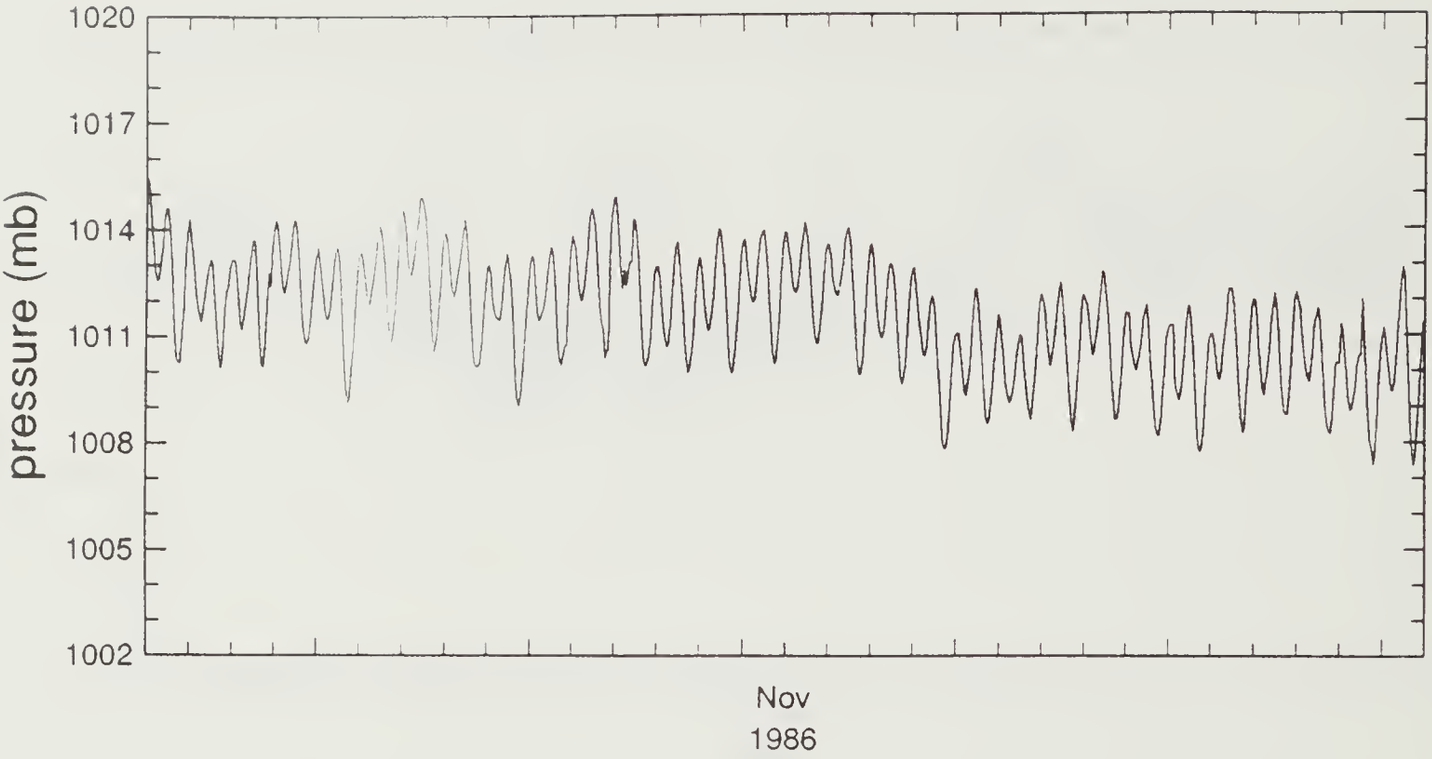
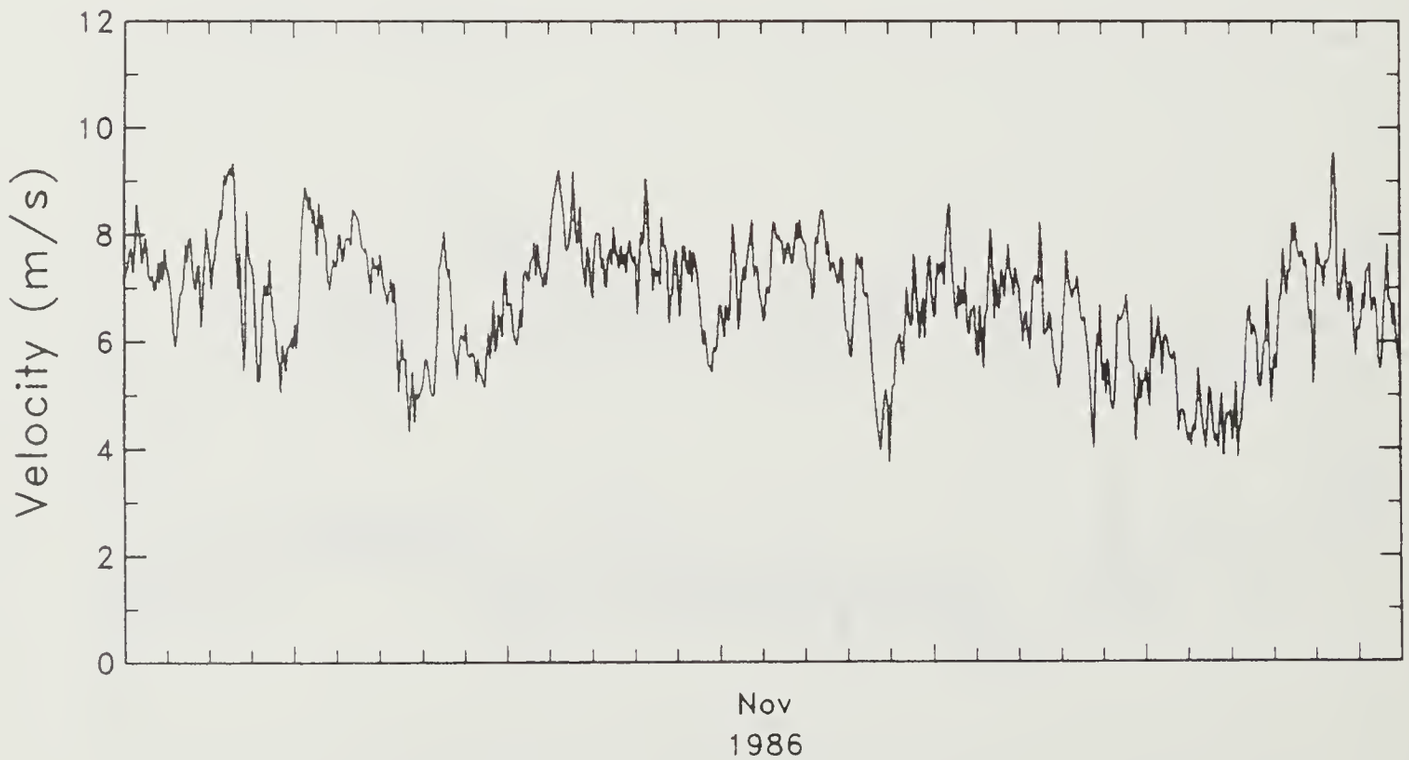
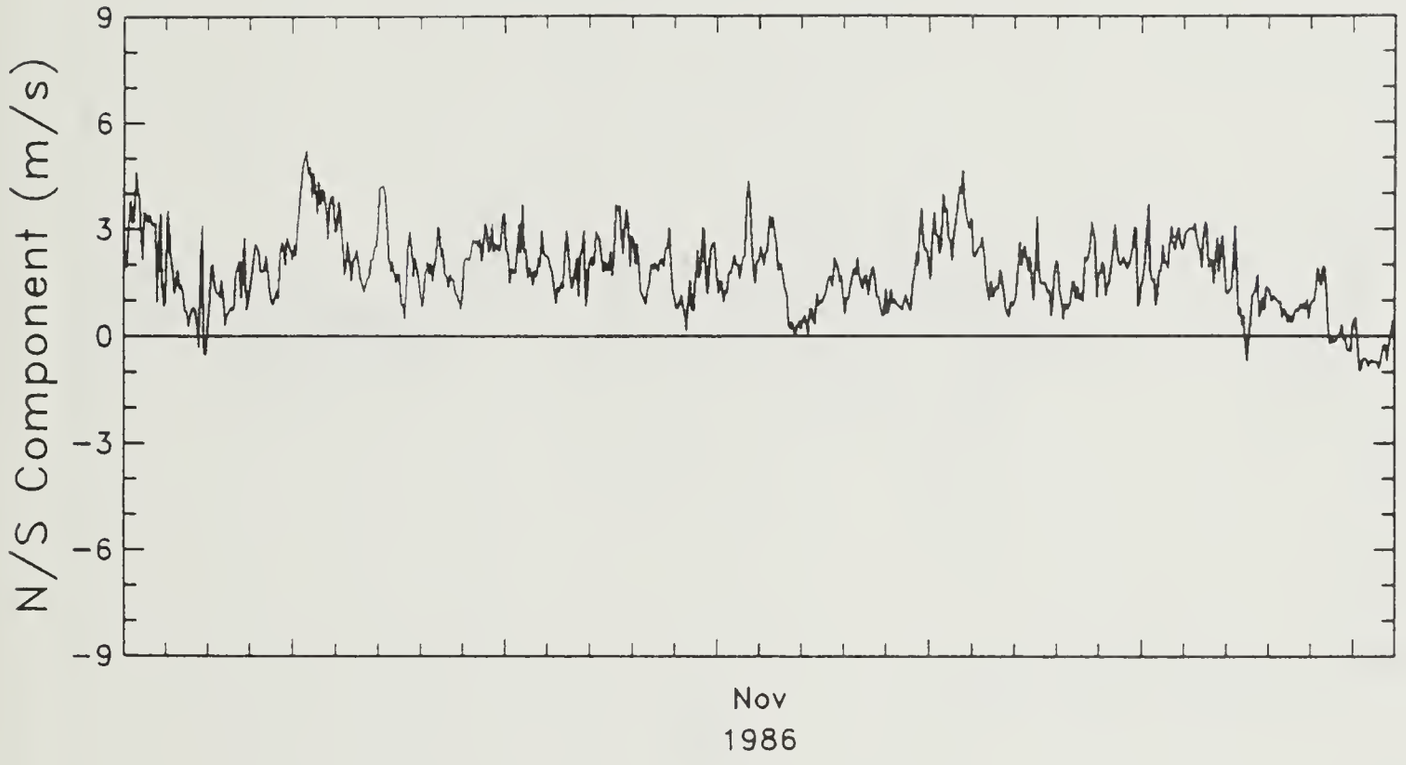
November 1986



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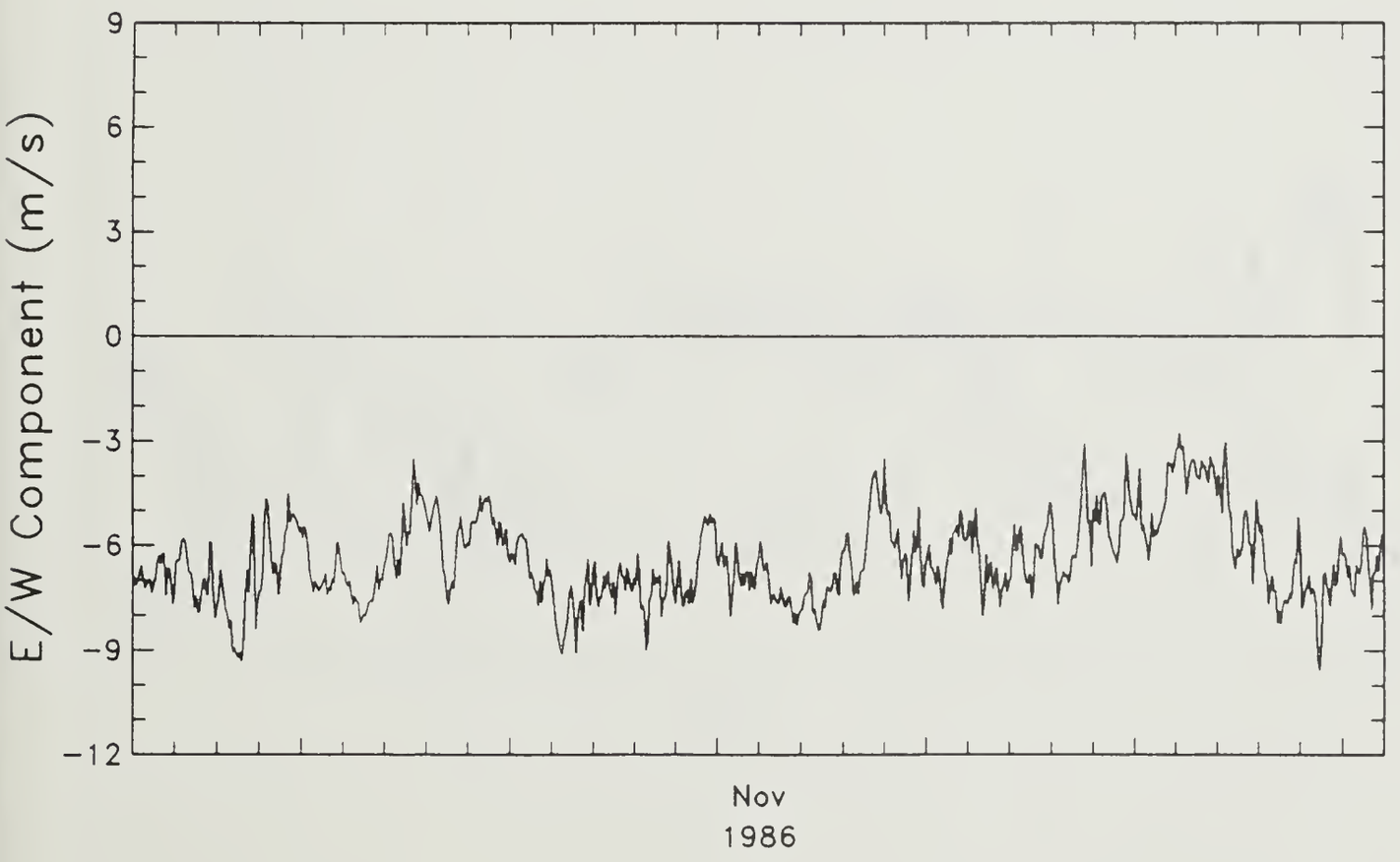
-6
-9
Nov
1986


E/W Component (m/s)
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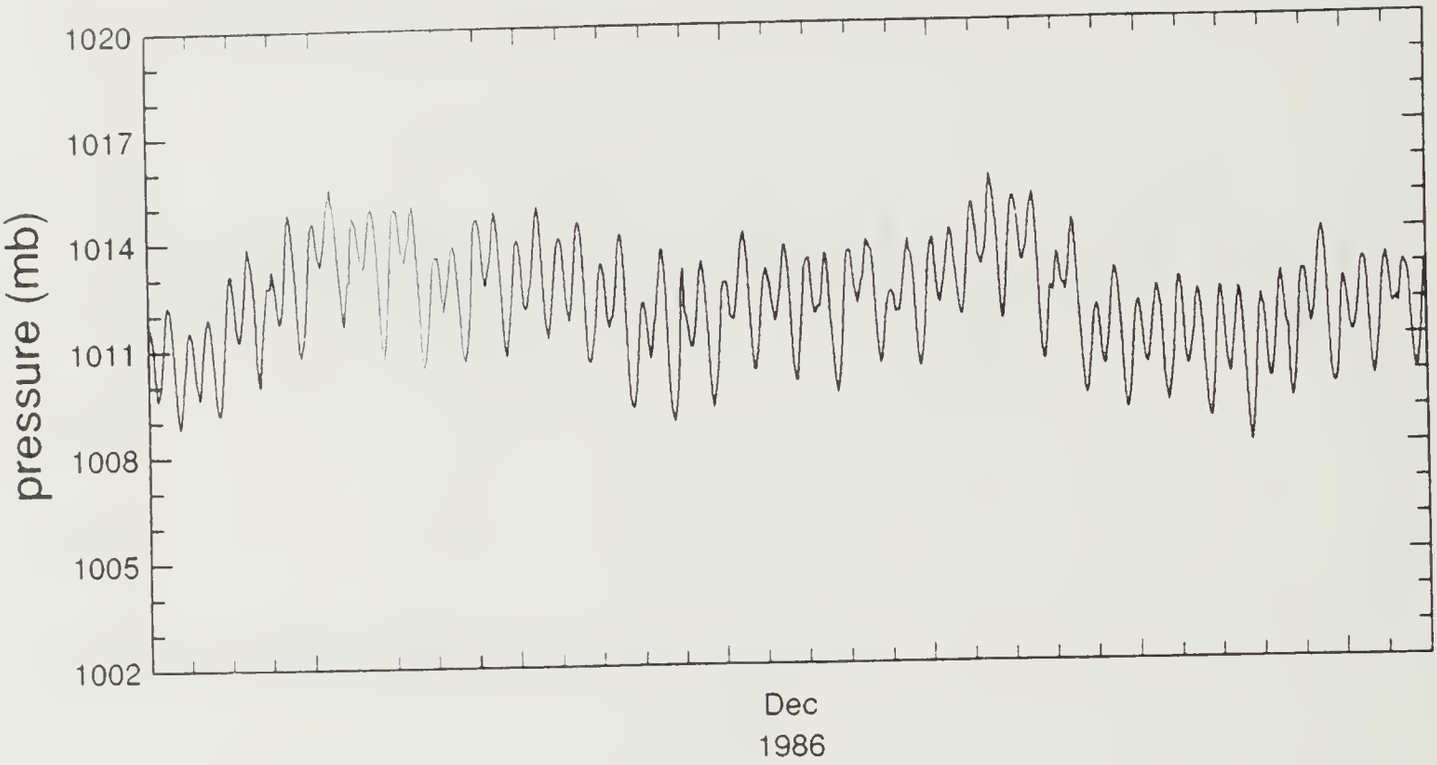
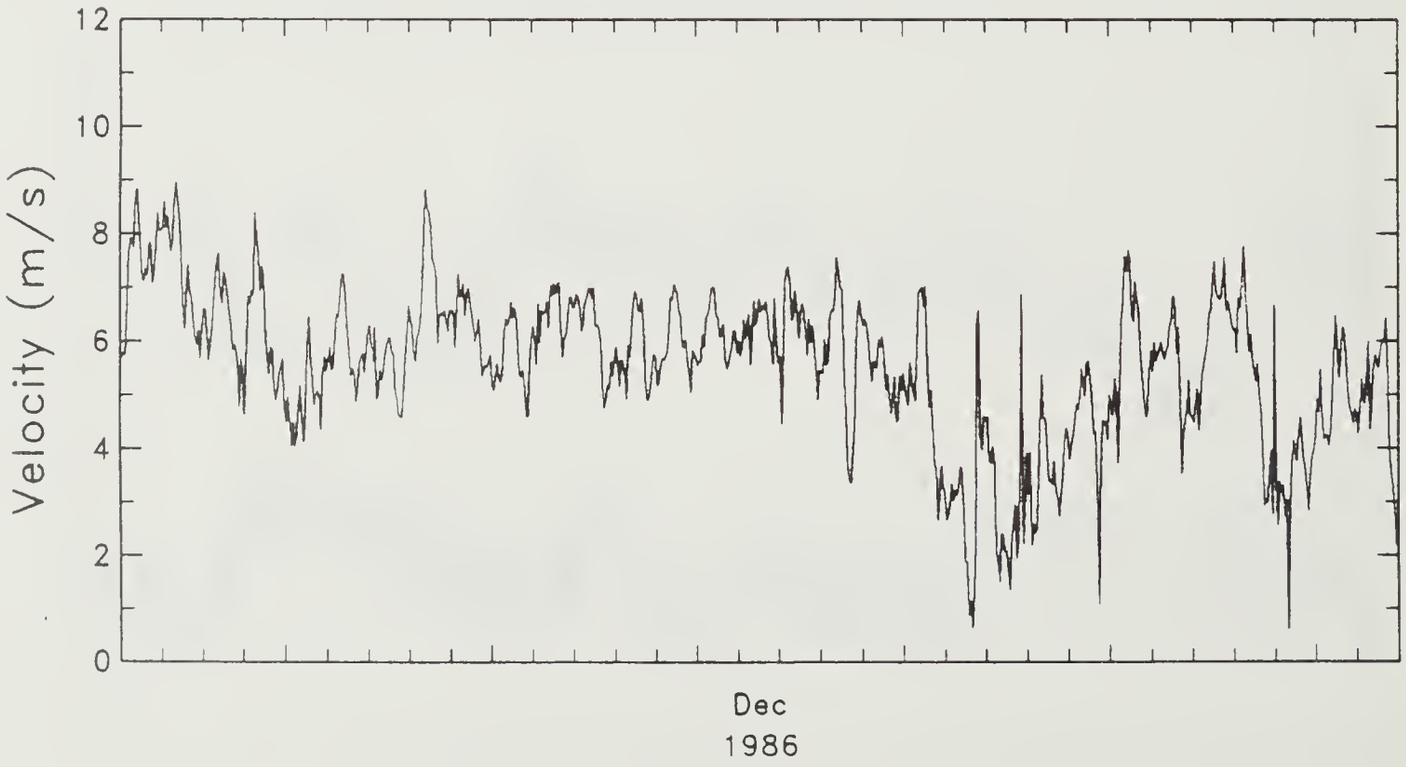
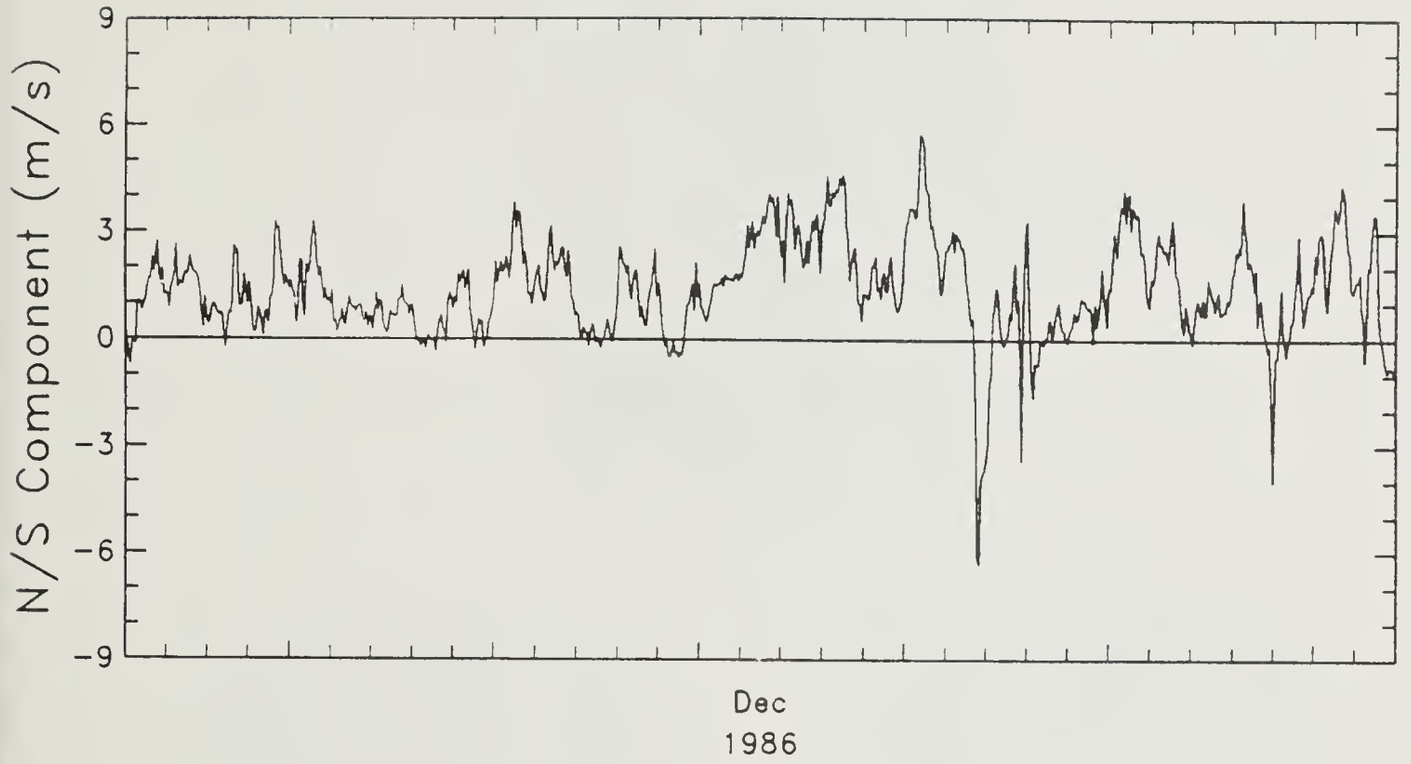
Nov
1986

December 1986



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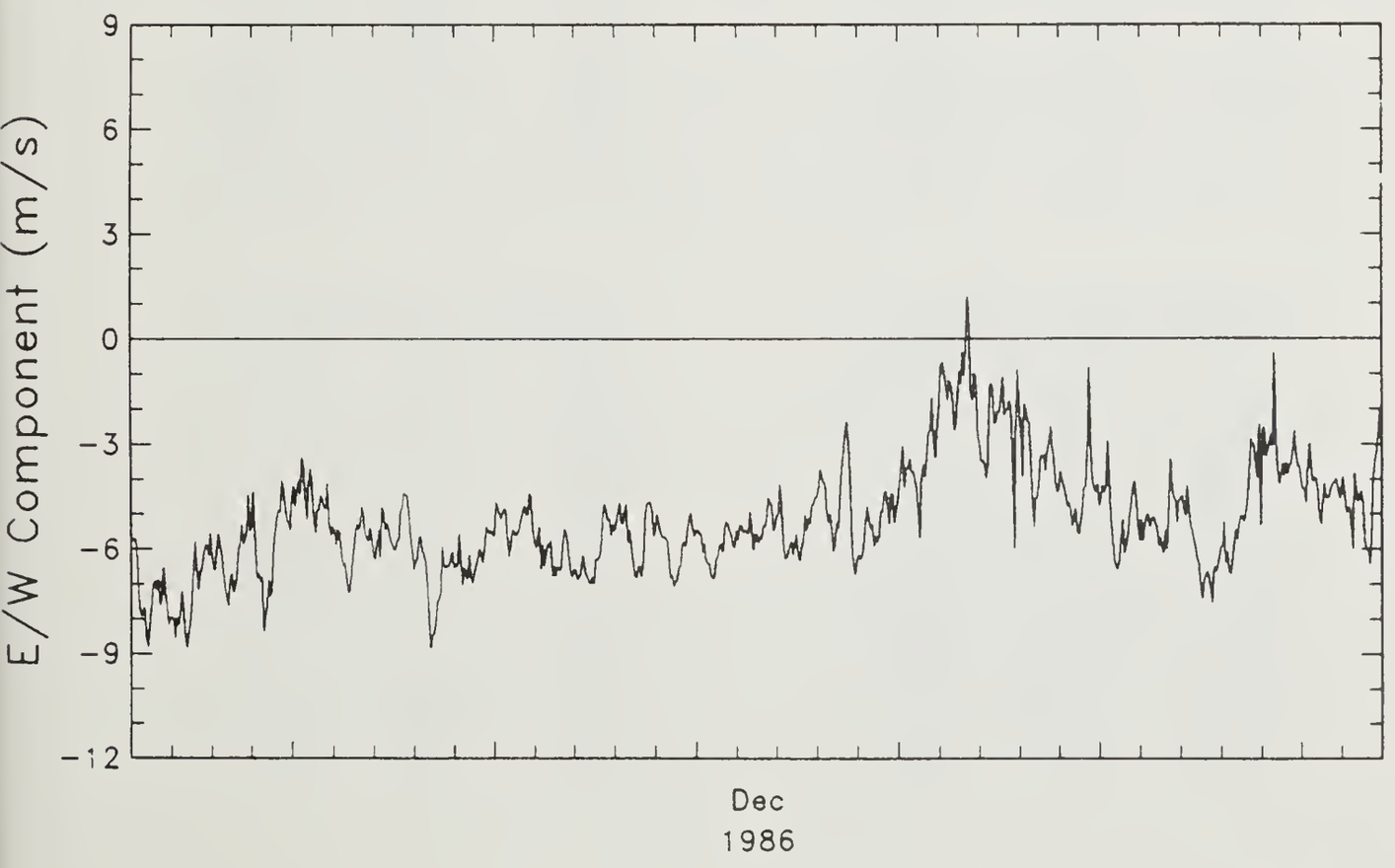
N/S Component (m/s)
Dec
1986


9
6
3
0
-3
-6
-9
-12
E/W Component (m/s)
Dec
1986

1986 Pressure (mb)		
Month	**Mean**	**Std Dev**
Jan	1011.59	1.37
Feb	1010.98	1.82
Mar	1011.17	1.53
Apr	1010.14	1.51
May	1010.86	1.55
Jun	1012.78	1.11
Jul	1015.61	1.60
Aug	1014.42	1.50
Sep	1013.93	1.60
Oct	1012.77	1.87
Nov	1011.53	1.61
Dec	1012.13	1.50

1986 Velocity		
Month	**Mean**	**Std Dev**
Jan	3.80	1.61
Feb	3.64	1.46
Mar	3.32	1.54
Apr	2.65	1.21
May	4.87	1.12
Jun	5.62	2.02
Jul	6.13	1.48
Aug	6.76	1.27
Sep	6.29	1.49
Oct	6.87	1.10
Nov	6.75	1.12
Dec	5.55	1.42

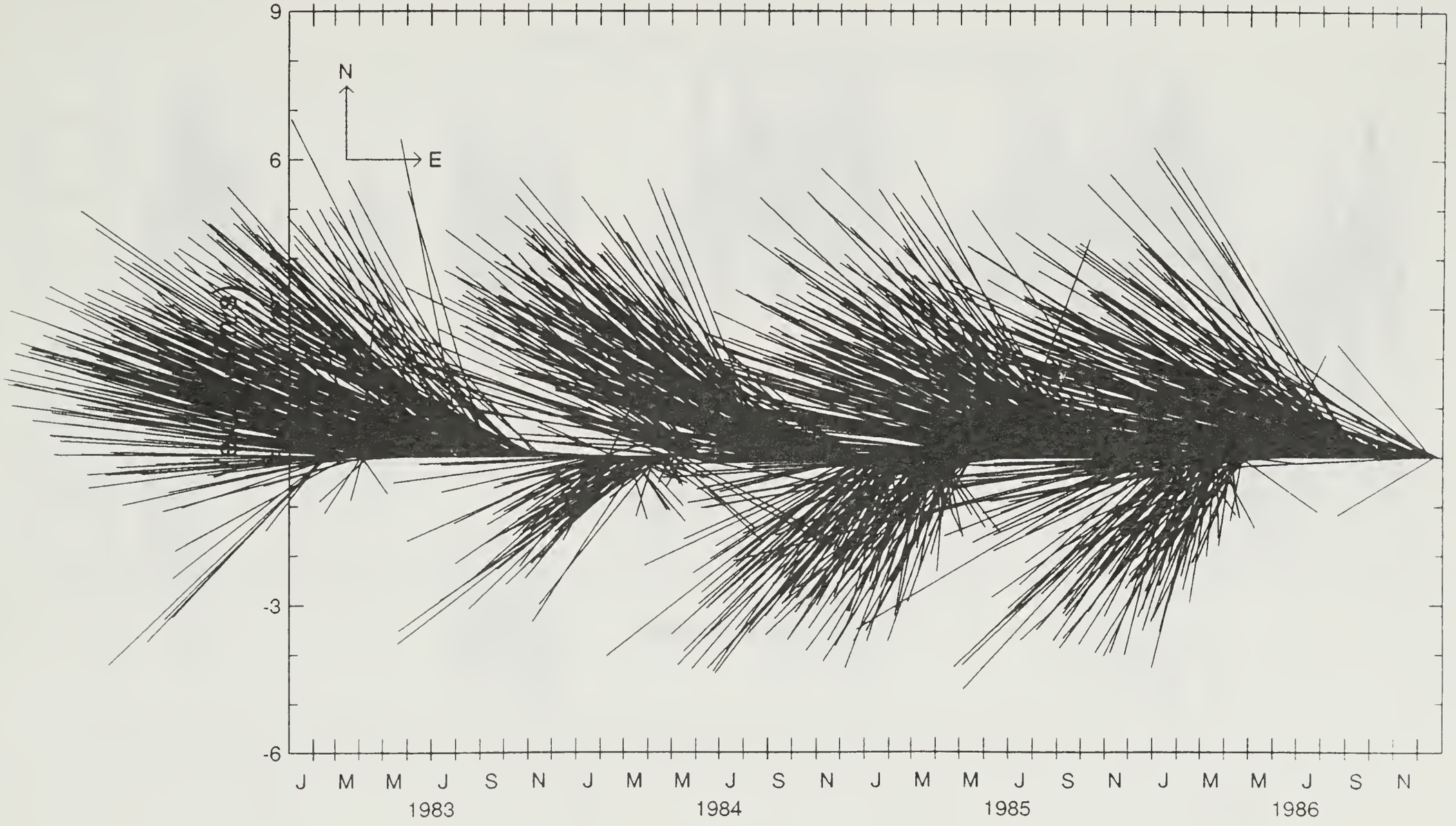
1986 Direction		
Month	**Mean**	**Std Dev**
Jan	-101.71	48.85
Feb	-117.34	77.03
Mar	-108.23	109.23
Apr	-86.35	107.37
May	-90.41	18.25
Jun	-65.58	40.21
Jul	-67.70	18.09
Aug	-67.32	16.68
Sep	-54.30	17.89
Oct	-71.47	13.43
Nov	-73.70	10.18
Dec	-73.92	20.59

1986 E-W Component		
Month	**Mean**	**Std Dev**
Jan	-2.99	1.78
Feb	-1.99	1.61
Mar	-1.40	1.48
Apr	-1.43	1.66
May	-4.69	1.24
Jun	-5.05	2.56
Jul	-5.48	1.75
Aug	-6.06	1.66
Sep	-4.91	1.55
Oct	-6.38	1.29
Nov	-6.40	1.21
Dec	-5.15	1.55

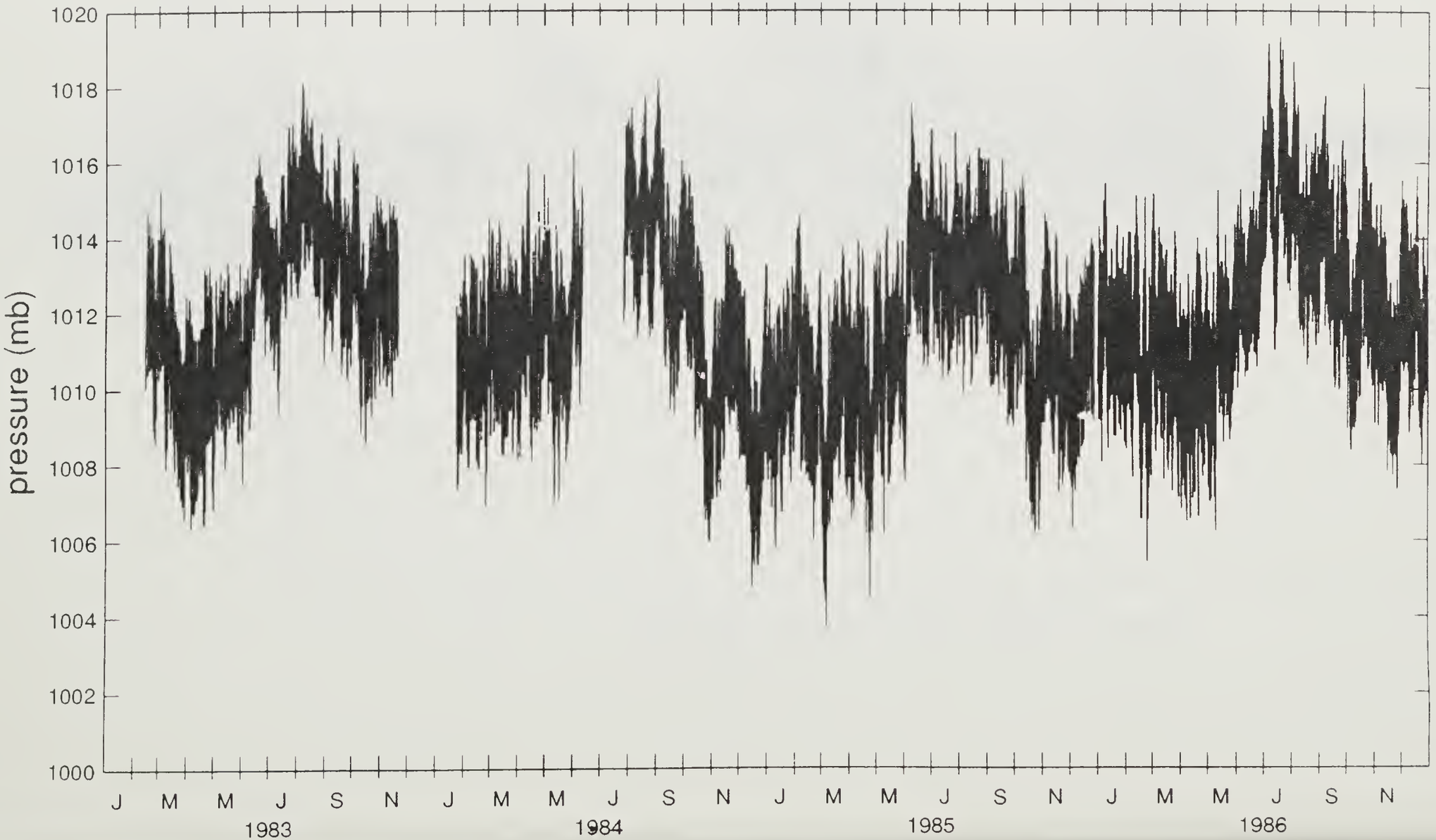
1986 N-S Component		
Month	**Mean**	**Std Dev**
Jan	-1.04	1.95
Feb	-2.49	1.63
Mar	-2.76	1.27
Apr	-1.57	1.12
May	0.09	1.22
Jun	1.35	1.35
Jul	2.09	1.51
Aug	2.35	1.52
Sep	3.52	1.72
Oct	2.05	1.38
Nov	1.80	1.07
Dec	1.40	1.38

1983-86

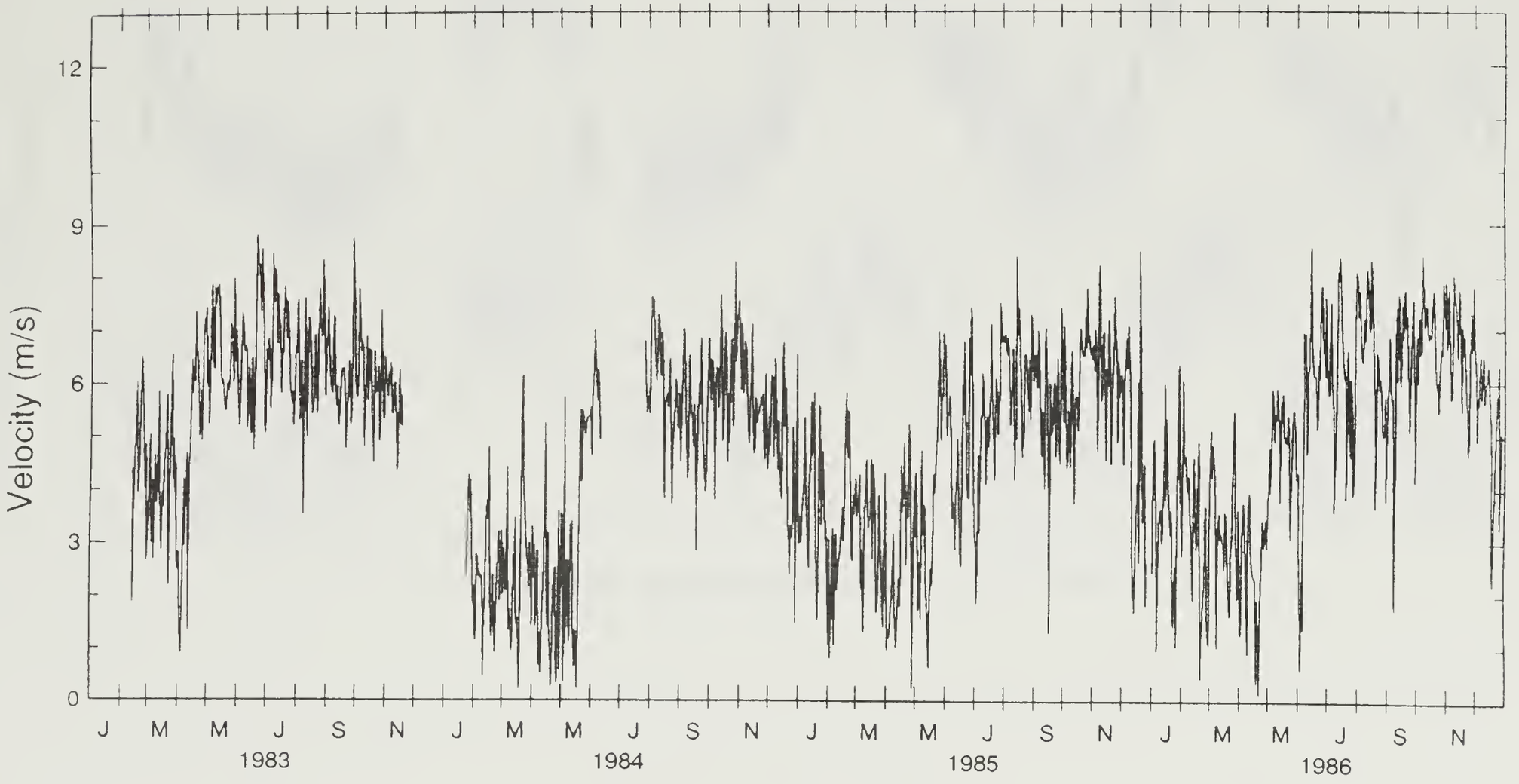
1983-86 Wind Speed (daily values)



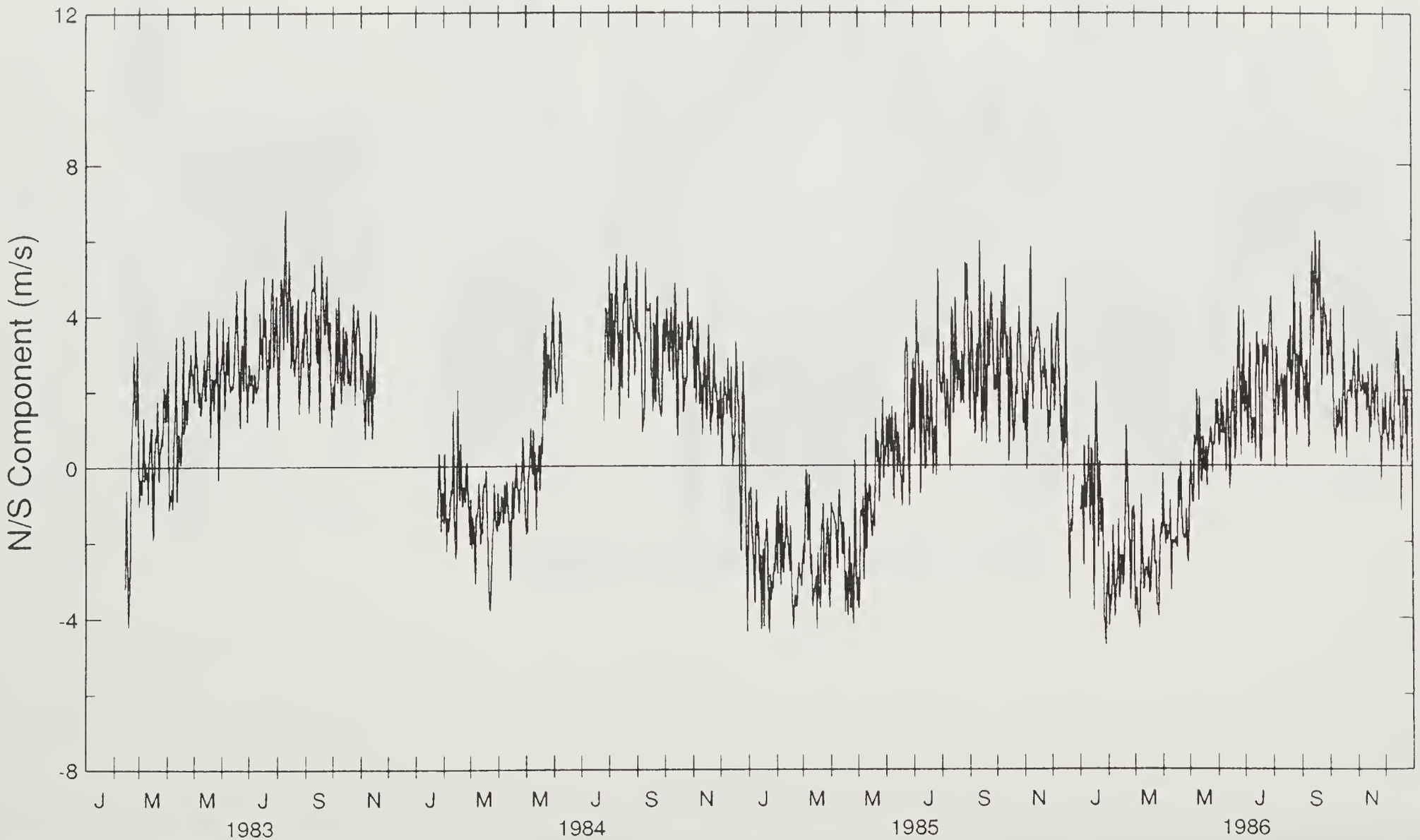
1983-86 Pressure



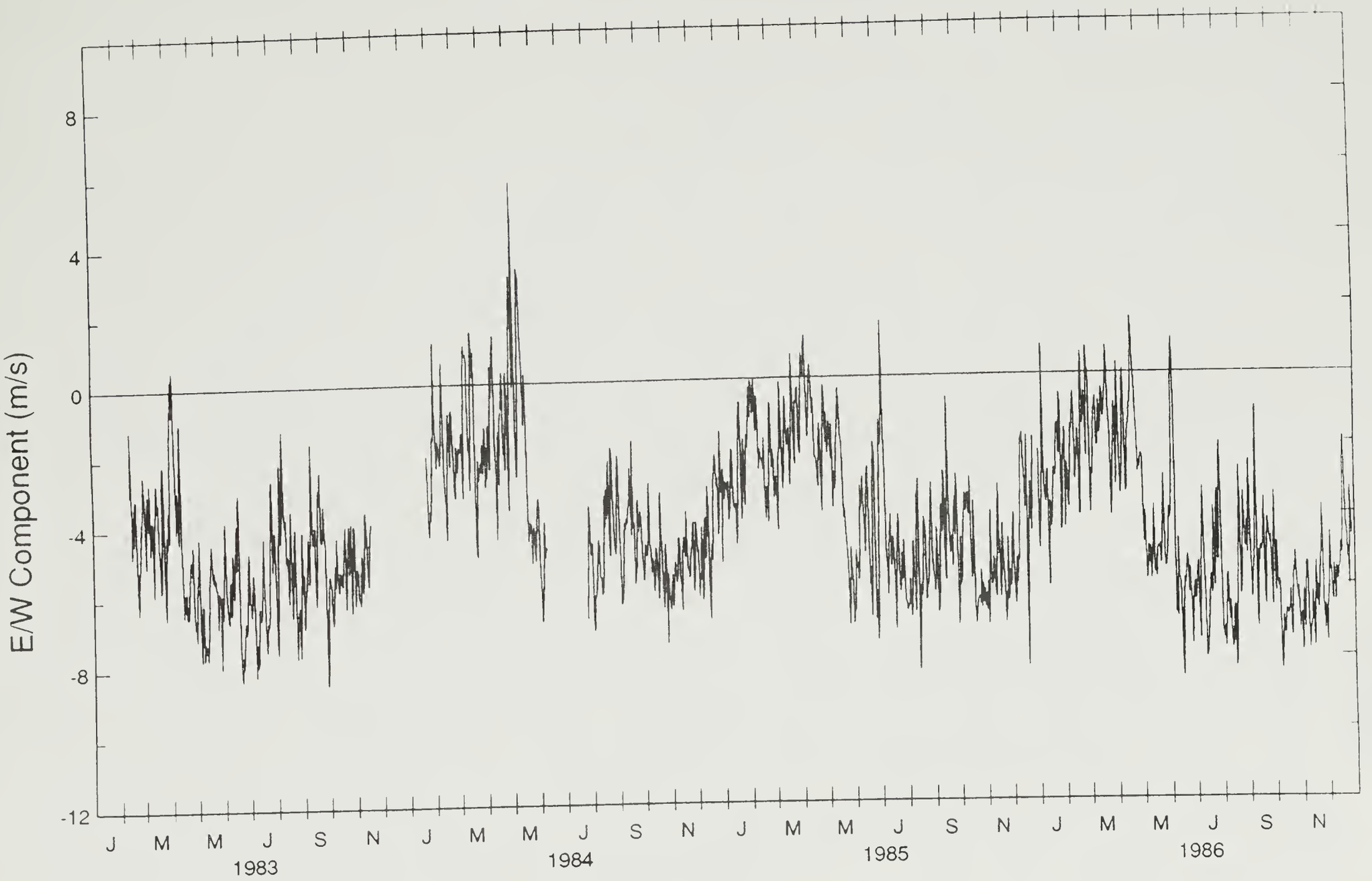
1983-86 Wind Speed (daily values)



1983-86 Wind Meridional Component



1983-86 Wind Zonal Component



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